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Western Mining in the Twentieth Century Series

John Sealy Livermore

# PROSPECTOR, GEOLOGIST, PUBLIC RESOURCE ADVOCATE: CARLIN MINE DISCOVERY, 1961; NEVADA GOLD RUSH, 1970S

With Introductions by
Arthur A. Brant
and
Andy B. Wallace

Interviews conducted by
Eleanor Swent
in 1992, 1997, and 2000
and by
Maurice Fuerstenau
in 1997

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Since 1954 the Regional Oral History Office has been interviewing leading participants in or well-placed witnesses to major events in the development of northern California, the West, and the nation. Oral history is a method of collecting historical information through tape-recorded interviews between a narrator with firsthand knowledge of historically significant events and a well-informed interviewer, with the goal of preserving substantive additions to the historical record. The tape recording is transcribed, lightly edited for continuity and clarity, and reviewed by the interviewee. The corrected manuscript is indexed, bound with photographs and illustrative materials, and placed in The Bancroft Library at the University of California, Berkeley, and in other research collections for scholarly use. Because it is primary material, oral history is not intended to present the final, verified, or complete narrative of events. It is a spoken account, offered by the interviewee in response to questioning, and as such it is reflective, partisan, deeply involved, and irreplaceable.

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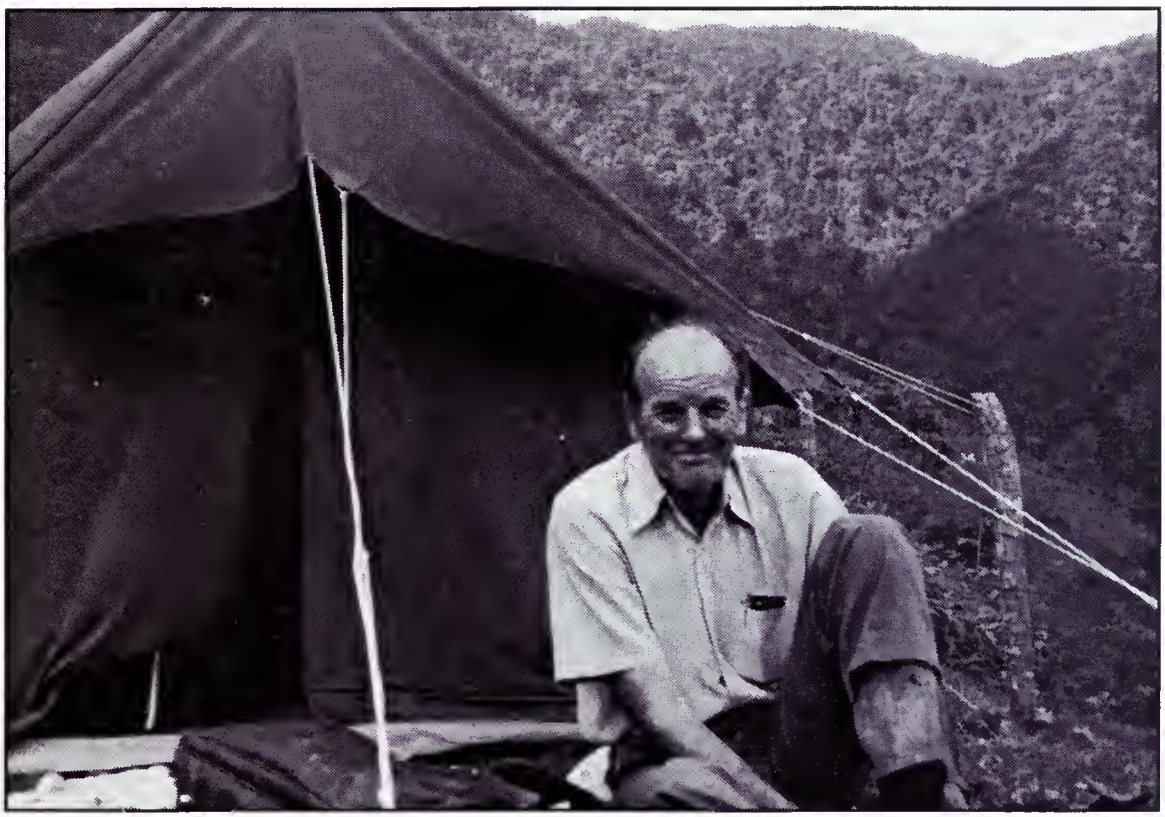

John Sealy Livermore at Rio Conde camp, Colombia, 1986.

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Livermore family in California from 1850, Montesol Ranch, Redington, Oat Hill quicksilver mines; education: Miss Paul's School, San Francisco, Thacher School, Ojai, CA, Stanford and early training in Alaska; WWII experiences: USGS Strategic Minerals Program, Navy Civil Engineering Corps; geologist, 1946-52: El Paso Mines, CO, Humphreys Gold Corp., FL, Standard mine, NV; Newmont Mining Co., 1952-70: Resurrection, Iowa Gulch mines, CO; Cuajone, Peru; exploration in Turkey, Iran, Chile, Ireland, Spain; Ambrosia Lake, NM; Zellidja, Morocco; Algeria; Eureka, NV; Similkameen, BC; Carlin, NV, discovery, 1961; partner, Cordex Syndicate, from 1970: Pinson, Preble, Dee, Florida Canyon mines, NV; exploration, Colombia, Honduras, China; public service activities in Nevada: mining law mediation, Walker Lake conservation, Mackay School of Mines; developing water resources at Montesol Ranch; Corona mine, CA, reclamation; visit to Cuba, 1999-2000.

Introductions by Arthur A. Brant, Director of Research (retired), Newmont Exploration Co., and Andy B. Wallace, Exploration Manager, Cordex Exploration Co.

Interviewed in 1992, 1997, and 1999 by Eleanor Swent and in 1997 by Maurice Fuerstenau for the Western Mining in the Twentieth Century series. The Regional Oral History Office, The Bancroft Library, University of California, Berkeley.

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PREFACE

The oral history series on Western Mining in the Twentieth Century documents the lives of leaders in mining, metallurgy, geology, education in the earth and materials sciences, mining law, and the pertinent government bodies. The field includes metal, non-metal, and industrial minerals. In its tenth year the series numbers thirty-five volumes completed and others in process.

Mining has changed greatly in this century: in the technology and technical education; in the organization of corporations; in the perception of the national strategic importance of minerals; in the labor movement; and in consideration of health and environmental effects of mining.

The idea of an oral history series to document these developments in twentieth century mining had been on the drawing board of the Regional Oral History Office for more than twenty years. The project finally got underway on January 25, 1986, when Mrs. Willa Baum, Mr. and Mrs. Philip Bradley, Professor and Mrs. Douglas Fuerstenau, Mr. and Mrs. Clifford Heimbucher, Mrs. Donald McLaughlin, and Mr. and Mrs. Langan Swent met at the Swent home to plan the project, and Professor Fuerstenau agreed to serve as Principal Investigator.

An advisory committee was selected which included representatives from the materials science and mineral engineering faculty and a professor of history of science at the University of California at Berkeley; a professor emeritus of history from the California Institute of Technology; and executives of mining companies. Langan Swent delighted in referring to himself as "technical advisor" to the series. He abetted the project from the beginning, directly with his wise counsel and store of information, and indirectly by his patience as the oral histories took more and more of his wife's time and attention. He completed the review of his own oral history transcript when he was in the hospital just before his death in 1992. As some of the original advisors have died, others have been added to help in selecting interviewees, suggesting research topics, and securing funds.

The project was presented to the San Francisco section of the American Institute of Mining, Metallurgical, and Petroleum Engineers (AIME) on "Old-timers Night," March 10, 1986, when Philip Read Bradley, Jr., was the speaker. This section and the Southern California section of AIME provided initial funding and organizational sponsorship.

The Northern and Southern California sections of the Woman's Auxiliary to the AIME (WAAIME), the California Mining Association, and the Mining and Metallurgical Society of America (MMSA) were early supporters. Later the National Mining Association became a sponsor. The

project was significantly advanced by a generous bequest received in November 1997 upon the death of J. Ward Downey, UC Berkeley alumnus and early member of the mining series advisory committee. His own oral history was completed in 1992. Other individual and corporate donors are listed in the volumes. Sponsors to date include nineteen corporations, four foundations, and 113 individuals. The project is ongoing, and funds continue to be sought.

The first five interviewees were all born in 1904 or earlier. Horace Albright, mining lawyer and president of United States Potash Company, was ninety-six years old when interviewed. Although brief, this interview adds another dimension to a man known primarily as a conservationist.

James Boyd was director of the industry division of the military government of Germany after World War II, director of the U.S. Bureau of Mines, dean of the Colorado School of Mines, vice president of Kennecott Copper Corporation, president of Copper Range, and executive director of the National Commission on Materials Policy. He had reviewed the transcript of his lengthy oral history just before his death in November, 1987. In 1990, he was inducted into the National Mining Hall of Fame, Leadville, Colorado.

Philip Bradley, Jr., mining engineer, was a member of the California Mining Board for thirty-two years, most of them as chairman. He also founded the parent organization of the California Mining Association, as well as the Western Governors Mining Advisory Council. His uncle, Frederick Worthen Bradley, who figures in the oral history, was in the first group inducted into the National Mining Hall of Fame in 1988.

Frank McQuiston, metallurgist for the Raw Materials Division of the Atomic Energy Commission and vice president of Newmont Mining Corporation, died before his oral history was complete; thirteen hours of taped interviews with him were supplemented by three hours with his friend and associate, Robert Shoemaker.

Gordon Oakeshott, geologist, was president of the National Association of Geology Teachers and chief of the California Division of Mines and Geology.

These oral histories establish the framework for the series; subsequent oral histories amplify the basic themes. After over thirty individual biographical oral histories were completed, a community oral history was undertaken, documenting the development of the McLaughlin gold mine in the Napa, Yolo, and Lake Counties of California (the historic Knoxville mercury mining district), and the resulting changes in the surrounding communities. This comprises forty-three interviews.

Future researchers will turn to these oral histories to learn how decisions were made which led to changes in mining engineering education, corporate structures, and technology, as well as public policy regarding minerals. In addition, the interviews stimulate the deposit, by interviewees and others, of a number of documents, photographs, memoirs, and other materials related to twentieth century mining in the West. This collection is being added to The Bancroft Library's extensive holdings. A list of completed and in process interviews for the mining series appears at the end of this volume.

The Regional Oral History Office is under the direction of Willa Baum, division head, and under the administrative direction of The Bancroft Library.

Interviews were conducted by Malca Chall and Eleanor Swent.

Willa K. Baum, Division Head
Regional Oral History Office

Eleanor Swent, Project Director
Western Mining in the Twentieth
Century Series

January 1998
Regional Oral History Office
University of California, Berkeley

## Western Mining in the Twentieth Century Oral History Series

### Interviews Completed, November 2000

Horace Albright, *Mining Lawyer and Executive, U.S. Potash Company, U.S. Borax, 1933-1962*, 1989

Samuel S. Arentz, Jr., *Mining Engineer, Consultant, and Entrepreneur in Nevada and Utah, 1934-1992*, 1993

James Boyd, *Minerals and Critical Materials Management: Military and Government Administrator and Mining Executive, 1941-1987*, 1988

Philip Read Bradley, Jr., *A Mining Engineer in Alaska, Canada, the Western United States, Latin America, and Southeast Asia*, 1988

Catherine C. Campbell, *Ian and Catherine Campbell, Geologists: Teaching, Government Service, Editing*, 1989

William Clark, *Reporting on California's Gold Mines for the State Division of Mines and Geology, 1951-1979*, 1993

John Robert Clarkson, *Building the Clarkson Company, Making Reagent Feeders and Valves for the Mineral Industry, 1935 to 1998*, 1999

Norman Cleaveland, *Dredge Mining for Gold, Malaysian Tin, Diamonds, 1921-1966; Exposing the 1883 Murder of William Raymond Morley*, 1995

James T. Curry, Sr., *Metallurgist for Empire Star Mine and Newmont Exploration, 1932-1955; Plant Manager for Calaveras Cement Company, 1956-1975*, 1990

Donald Dickey, *The Oriental Mine, 1938-1991*, 1996

J. Ward Downey, *Mining and Construction Engineer, Industrial Management Consultant, 1936 to the 1990s*, 1992

Warren Fenzi, *Junior Engineer to President, Director of Phelps Dodge, 1937 to 1984*, 1996

Hedley S. "Pete" Fowler, *Mining Engineer in the Americas, India, and Africa, 1933-1983*, 1992

James Mack Gerstley, *Executive, U.S. Borax & Chemical Corporation; Trustee, Pomona College; Civic Leader, San Francisco Asian Art Museum*, 1991

Robert M. Haldeman, *Managing Copper Mines in Chile: Braden, CODELCO, Minerec, Pudahuel; Developing Controlled Bacterial Leaching of Copper from Sulfide Ores; 1941-1993*, 1995

John F. Havard, *Mining Engineer and Executive, 1935-1981*, 1992

Wayne Hazen, *Plutonium Technology Applied to Mineral Processing; Solvent Extraction; Building Hazen Research; 1940-1993*, 1995

George Heikes, *Mining Geologist on Four Continents, 1924-1974*, 1992

Helen R. Henshaw, *Recollections of Life with Paul Henshaw: Latin America, Homestake Mining Company*, 1988

*Homestake Mine Workers, Lead, South Dakota, 1929-1993*, interviews with Clarence Kravig, Wayne Harford, and Kenneth Kinghorn, 1995

Lewis L. Huelsdonk, *Manager of Gold and Chrome Mines, Spokesman for Gold Mining, 1935-1974*, 1988

William Humphrey, *Mining Operations and Engineering Executive for Anaconda, Newmont, Homestake, 1950 to 1995*, 1996

Hugh C. Ingle, Jr., *Independent Small Mines Operator, 1948 to 1999; Corona Mine*, 2000

James Jensen, *Chemical and Metallurgical Process Engineer: Making Deuterium, Extracting Salines and Base and Heavy Metals, 1938-1990s*, 1993

Arthur I. Johnson, *Mining and Metallurgical Engineer in the Black Hills: Pegmatites and Rare Minerals, 1922 to the 1990s*, 1990

G. Frank Joklik, *Exploration Geologist, Developer of Mt. Newman, President and CEO of Kennecott, 1949-1996; Chairman, Salt Lake 2002 Olympic Winter Games Committee*, 1997

Evan Just, *Geologist: Engineering and Mining Journal, Marshall Plan, Cyprus Mines Corporation, and Stanford University, 1922-1980*, 1989

Robert Kendall, *Mining Borax, Shaft-Freezing in Potash Mines, U.S. Borax, Inc., 1954-1988*, 1994

*The Knoxville Mining District, The McLaughlin Gold Mine, Northern California, Volume I*, 1998

Anderson, James, "Homestake Vice President-Exploration"
Baker, Will, "Citizen Activist, Yolo County"
Birdsey, Norman, "Metallurgical Technician, McLaughlin Process Plant"
Bledsoe, Brice, "Director, Solano Irrigation District"

*The Knoxville Mining District, The McLaughlin Gold Mine, Northern California, Volume II*, 1998

Cerar, Anthony, "Mercury Miner, 1935-1995"
Ceteras, John, "Organic Farmer, Yolo County"
Conger, Harry, "President, Chairman, and CEO, Homestake Mining Company, 1977 to 1994"
Corley, John Jay, "Chairman, Napa County Planning Commission, 1981 to 1985"
Cornelison, William, "Superintendent of Schools, Lake County" (Includes an interview with John A. Drummond, Lake County Schools Attorney)

*The Knoxville Mining District, The McLaughlin Gold Mine, Northern California, Volume III*, 1998

Crouch, David, "Homestake Corporate Manager-Environmental Affairs"
Enderlin, Elmer, "Miner in Fifty-Eight Mines"
Fuller, Claire, "Fuller's Superette Market, Lower Lake"
Goldstein, Dennis, "Homestake Corporate Lawyer"
Guinivere, Rex, "Homestake Vice President-Engineering"

*The Knoxville Mining District, The McLaughlin Gold Mine, Northern California, Volume IV*, 1998

Gustafson, Donald, "Homestake Exploration Geologist, 1975-1990"
Hanchett, Bonny Jean, "Owner and Editor, Clearlake Observer, 1955-1986"
Hickey, James, "Director of Conservation, Development, and Planning for Napa County, 1970 to 1990"
Jago, Irene, "The Jagos of Jago Bay, Clear Lake"
Jonas, James, "Lake County Fuel Distributor"
Koontz, Dolora, "Environmental Engineer, McLaughlin Mine, 1988-1995"

*The Knoxville Mining District, The McLaughlin Gold Mine, Northern California, Volume V*, 1998

Kritikos, William, "Operator, Oat Hill Mine"
Landman, John, "Rancher, Morgan Valley"
Lyons, Roberta, "Journalist and Environmentalist"
Madsen, Roger, "Homestake Mechanical Engineer"
Magoon, Beverly, "Merchant and Craft Instructor, Lower Lake"
McGinnis, Edward, "Worker at the Reed Mine"

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Robert McKenzie, "McKenzies in Monticello, Berryessa Valley
Harold Moskowite, "Napa County Supervisor"
Marion Onstad, "Neighbor and Employee of the McLaughlin Mine, 1980-1995"
Ronald Parker, "Resident Manager of the McLaughlin Mine, 1988-1994"
Richard Stoehr, "Homestake Engineer and Geologist to Senior Vice-President and Director"
Joseph Strapko, "Exploration Geologist, McLaughlin Mine Discovery, 1978"

*The Knoxville Mining District, The McLaughlin Gold Mine, Northern California, Volume VII*, 2000

Jack Thompson, "General Manager, McLaughlin Mine, 1981-1988"
Twyla Thompson, "County Supervisor, Yolo County, 1975-1985"
Avery Tindell, "Capay Valley Environmentalist"
John Turney, "McLaughlin Metallurgist: Pioneering Autoclaving for Gold"
Della Underwood, "Knoxville Rancher, McLaughlin Mine Surveyor"
Walter Wilcox, "County Supervisor, Lake County, 1979-1995"
Peter Scribner, "Boyhood at the Knoxville Mine, 1941-1944"

Marian Lane, *Mine Doctor's Wife in Mexico During the 1920s*, 1996

John Sealy Livermore, *Prospector, Geologist, Public Resource Advocate: Carlin Mine Discovery, 1961; Nevada Gold Rush, 1970s*, 2000

J. David Lowell, *Using Applied Geology to Discover Large Copper and Gold Mines in Arizona, Chile, and Peru*, 1999

Plato Malozemoff, *A Life in Mining: Siberia to Chairman of Newmont Mining Corporation, 1909-1985*, 1990

James and Malcolm McPherson, *Brothers in Mining*, 1992

Frank Woods McQuiston, Jr., *Metallurgist for Newmont Mining Corporation and U.S. Atomic Energy Commission, 1934-1982*, 1989

Gordon B. Oakeshott, *The California Division of Mines and Geology, 1948-1974*, 1988

James H. Orr, *An Entrepreneur in Mining in North and South America, 1930s to 1990s*, 1995

Vincent D. Perry, *A Half Century as Mining and Exploration Geologist with the Anaconda Company*, 1991

Patrick Purtell, *Maintenance and Management at the McLaughlin Mine, 1985 to 1997*, 1999

Carl Randolph, *Research Manager to President, U.S. Borax & Chemical Corporation, 1957-1986*, 1992

John Reed, *Pioneer in Applied Rock Mechanics, Braden Mine, Chile, 1944-1950; St. Joseph Lead Company, 1955-1960; Colorado School of Mines, 1960-1972*, 1993

Joseph Rosenblatt, *EIMCO, Pioneer in Underground Mining Machinery and Process Equipment, 1926-1963*, 1992

Eugene David Smith, *Working on the Twenty-Mule Team: Laborer to Vice President, U.S. Borax & Chemical Corporation, 1941-1989*, 1993

Simon Strauss, *Market Analyst for Non-ferrous Metals and Non-metallic Minerals, Journalist, Mining Corporation Executive, 1927-1994*, 1995

Langan W. Swent, *Working for Safety and Health in Underground Mines: San Luis and Homestake Mining Companies, 1946-1988*, 1995

James V. Thompson, *Mining and Metallurgical Engineer: the Philippine Islands; Dorr, Humphreys, Kaiser Engineers Companies; 1940-1990s*, 1992

William Wilder, *Owner of One Shot Mining Company: Manhattan Mercury Mine, 1965-1981*, 1996

Alexander M. Wilson, *Leading a Changing Utah Construction and Mining Company: Utah International, GE-Utah, BHP-Utah, 1954 to 1987*, 2000

## Interviews In Process

Frank Aplan, metallurgist
Harry M. Conger, Kaiser, Homestake
Dean Enderlin, "Mine Geologist, Reclamation Manager, McLaughlin Mine"
Guy Harris, metallurgist
Susan Harrison, "McLaughlin Natural Reserve"
Raymond Krauss, "Environmental Manager, McLaughlin Mine"
Robert Shoemaker, metallurgist

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Thomas and Margaret O'Neil
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Public Resource Foundation
Carl L. Randolph
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Mr. and Mrs. Richard J. Stoehr
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Milton Ward
Mr. and Mrs. Alexander M. Wilson

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Clemence DeGraw Jandrey Boyd
James Brown Boyd, Harry Bruce Boyd, Douglas Cane Boyd, and Hudson Boyd in memory of James Boyd
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Nancy S. and James T. Curry, Sr.
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Edward C. Dowling
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INTRODUCTION by Andy B. Wallace

I appreciate this opportunity to write about John Livermore. I am only one of a number of geologists that John helped along in their careers. I have struggled to write something meaningful, and have decided to simply tell a little of my story with John, and trust the reader to know that he has helped others, in many of the same ways.

I first met John Livermore on a cold winter day at Hasbrouck Mountain, just south of Tonopah, Nevada. A few months earlier, Paul Dircksen, a geologist for Cordex, had wandered into my student office at the University of Nevada, looking for a grad student to do some petrographic work on rock samples from Hasbrouck. I happened to be the only one in the office. I did the work and wrote a report to Cordex. In the work I noted an unusual mineral (adularia) that seemed to be associated with gold mineralization. At Paul's request, I accompanied a U.S. Geological Survey geologist (Bill Silberman) to visit Hasbrouck a few months after writing the report.

Hasbrouck is a round knob of a mountain, encircled with drill roads much in the style of a barber pole. Paul, Bill and I were working along the top of the hill when we noticed a tall, lanky gentleman quickly climbing up toward us in very long strides. That turned out to be John. After a very brief introduction, John began firing out questions, many of which had been suggested by my report which he had apparently read in detail. He was very interested in adularia. After an hour of this, John abruptly said good-bye and moved off down the hill. I remember feeling very drained and very stupid, as I couldn't answer even half his questions. I doubted I would see him again.

A few months later, Paul called and asked if I would be interested in a short-term mapping job for Cordex near Beatty, Nevada. I took this job and mapped at the Stirling[1] prospect in July and August. I heard little from anyone at Cordex until John Livermore arrived in Beatty one night to review my field work. We spent the next two days in the field. I was anxious to show John what I thought was important, but he had his own priorities. I remember slogging up one hill, chattering all the way only to realize John was across the canyon looking at rock outcrops I didn't think were important. The only good thing that happened that day was our examination of what I had mapped as a fault, with weak evidence. We cut a drill site the next day with a bulldozer. Luckily the dozer trench exposed a rusty fault zone about where I had predicted it. That

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[1]Mr. Wallace notes that this property "was called 'Stirling' when we owned it at Cordex. Property was sold to Greg Austin who thought the spelling confusing so started calling it 'Sterling'."

impressed John and led to my getting more work from him--in fact my whole career really came from that work at Stirling.

I mapped properties for John for the next several years. It was a great job, partly because John took time to come out from Reno and carefully review my work in the field. Most young geologists don't get that kind of help from a senior exploration person. He was an excellent teacher.

John believed in leading by example. He was always first at work and last to leave. We worked long hours, while in the field particularly, but no one really minded because we knew the "boss" was working longer. He taught us to treat expense account money from the company like it was our own. We learned to take pride in being frugal and always maximizing exploration effort per dollar spent. He taught us by example to live a healthy lifestyle of hard work, exercise, and proper eating. John is eighty years old now, and could easily pass for sixty as he is still vigorous and healthy of body and mind.

All this time I knew nothing of John, the person. He never talked of personal things. I gathered from office gossip that he was from the Bay Area. I well remember the day the San Francisco Examiner published a Sunday feature article on the Livermore family. I was amazed to learn about his family and their many accomplishments, particularly in public service. John was terribly embarrassed by it and remains to this day a very private person who never wants the limelight.

Over the next ten years, I continued to work with John at Cordex. I became restless as I grew older, and John recognized that I wanted to manage the exploration effort. I know now that he was not ready to leave Cordex, but he did so to clear the way for me to take over. That was a very unselfish act and one that I will always appreciate.

I believe John was happiest when in the field, working in the solitary and lonely way of the exploration geologist. I have watched him get involved in public service and the political arena over the last few years, striving to give back to the mining industry and his country. I know how hard it is for him, and I know if he had his druthers, he would choose to be a simple field geologist, trekking the mountains of the world.

John trained me to be an exploration manager, but the most important things he taught me are honesty and integrity in dealing with property owners. I never saw John do anything remotely underhanded. He always took the high road. Once, soon after John let me start negotiating deals, I cut a particularly tough agreement with a group of inexperienced lessors. When John reviewed the terms, he pointed out that with a few changes both sides could be made happy, and we could start with a good relationship rather than bad feelings. That cost our

company some short-term gain, but I believe we came out better in the long run. He has an impeccable reputation in our business, and gets the highest compliment from other geologists--he is known as a "straight shooter."

John gained financial success from his hard work in exploration, but he never changed in any way that I can see. He still lives in the same apartment in Reno, wears modest clothes, and is always driving the most fuel efficient, practical car he can find. He treats all people with respect, and doesn't have an ounce of arrogance. He is in the process of spreading his financial rewards throughout the west. He has funded and still supports major programs at Stanford and the University of Nevada, Reno. He never wants credit and usually is an "anonymous donor" if people let him have his way.

I can't ever repay John for being my mentor. It is difficult to repay someone who never wants any credit for being what he is. I am glad to have the opportunity to write this introduction, and to say a few things which I hope properly reflect the views of many of John's colleagues.

Andy B. Wallace
Exploration Manager, Cordex Exploration Co.

Reno, Nevada
March 1999

INTRODUCTION by Arthur Brant

I have the honor of presenting the introduction to the documentation of John S. Livermore's remarkable mining, resource, and humanitarian contributions.

My association and friendship dates from 1952 to the present and has been continuous but intermittent in that our domiciling and activities were in related but different aspects.

This introduction will concentrate on the man, his character, his strengths, behavior under stress, patience, treatment of associates, continuity despite reversals. To me it is a remarkable example of how business and operations should be, and can be, conducted.

As an aside, the most efficient system is based on integrity and honesty, not on how to beat the system. Associates and employees respond best to respect, continuity, the integrity of the operations, and the integrity and effort of the leader.

John Livermore is a quiet, mannerly, honest industrious example, not the blatant, dissonant, sloppy television hero.

As I recall, it was a late spring or early summer afternoon at the old United Verde Extension buildings in Jerome, Arizona, where our group was experimenting with geophysical exploration techniques and searching as well for new mineralization, when John Livermore came into the main room. It was a well mannered entry, purposeful but a little hesitant, bearing straight, dress neat. He stopped before me, tall, relaxed, mannerly, saying in good enunciation he had been released from army service and could we use a geologist.

I had had much experience in judging humans, as a professor teaching several of the returning soldiers, coaching ice hockey teams, men and women, at Toronto, Princeton and Lawrenceville, Berlin, Poland, and Garmisch.

I concluded without doubt this was one gentleman we should hire and recommended he go see Dr. Hal Norman at Leadville, Colorado, where we operated a small mine and active exploration.

This was the start of John's Newmont Mining association 1952--to the Carlin Gold discovery in 1961--to resignation from Newmont and formation of the Cordex Exploration and Development Syndicate.

In the interim, 1951-61 on behalf of Newmont Mining and President Fred Searls, John was active in worldwide exploration. Following

Leadville (Resurrection Mine) and Cripple Creek area, Colorado, and the Arizona [type] porphyry copper Cuajone discovery in South Peru just north of the known operations at AS&R's Toquepala and Quellaveco, came a stint in the south Turkey mountains and Iran, far distant from the Grecian culture and biblical history of the eastern Mediterranean cities. One after another our men acquired hepatitis. John included, and our in Canada geologist Platt Benedict. Though associated with Cuajone, I did not run into John in this period.

Apparently John was asked to work out of the New York office, 1957, and on assignment spent time in Venezuela and Chile, and in Morocco and Algeria. I saw John in North Africa returning from one of my frequent trips to South Africa. We had a small operating mine near Oujda. The ore (lead-zinc) was in Algeria but the shaft was in Morocco, a tunnel (drift) running across the border into Algeria. Escorted Algerian workers crossed daily to Morocco and returned escorted to Algeria. John and I had a pleasant day reminiscing and seeing the countryside. John as usual was buoyant and interested in the country and its activities and vineyards to the south. The next day I spent with the Caid of Fez seeing the old walled city and absorbing its history.

Events were leading to the Carlin discovery. Nevada's gold potential was recognized, originally by the D. W. Vandenburg report of 1939, which also mentions fine gold not visible in the gold pan. Additional ore on strike at depth was discovered at Getchell indicating that such occurrences might occur at depth without outcropping. Such was the Carlin discovery. Sub-pan gold with depth continuity suggested, indicated and inferred by John Livermore and Alan Coope in 1961.

John's next stop for the next eight years was manager of geological exploration in Canada, always an active area. Similkameen in B.C. was discovered, Sherritt Gordon was merged, North Manitoba, work at Granduc north B.C. was continued, and effort was made in Ireland and Spain. Ireland was interesting, so historic, the remaining Celtic foothold, so hospitable, so talkative, a bit difficult terminating at night, and reactivating in the morning.

John eventually left Newmont to set up his own exploration organization, as many geologists have done, to concentrate on area and decision, and to experience development after discovery, e.g. Leo Miller of Texas Gulf in Colorado, and Dave Lowell in Arizona and Peru. At any rate, the Cordex Syndicate was formed in 1970, John, Pete Galli and later G. W. DeLaMare and in 1984 Andy Wallace.

One of the first prospects was the Pinson Area, six miles south of Getchell. John found out that DeLaMare had at one time held the property but had let it lapse. John contacted DeLaMare to be sure he was not usurping, and a lasting friendship ensued. Later as a Cordex

member DeLaMare, by geologic evidence, found the Preble Mine property twelve miles to the south of Getchell.

The Cordex Syndicate and Cordex Exploration prospered, the Florida Canyon Mine and Dee Mine resulting in the eighties. But note it was ten years after Cordex formation before John allowed Cordex to be active in any Newmont area.

I mention one other item, John's trip to China with Columbia Professor John Kuo, my longtime friend. Deposits visited exhibited limited tonnage potential.

We now touch on John's public service activities, continuing and considerable over time. John's long term interest in the rejuvenation of Walker Lake, and public support thereto. The Mackay School of Mines, University of Nevada, Reno, and the DeLaMare Memorial Engineering Library to be dedicated October 15, 1997.

The Arthur Brant Chair of Geophysics intended to develop drill hole exploration systems to give depth and lateral extended coverage. The purpose unfortunately aborted in that a suitable personage was not forthcoming, but eventually accepted into the future by Dr. Jim Taranik with his superb background. Though disappointed John at no time reviled the fates, or lost purpose.

The Montesol family ranch, some ten miles north of Calistoga toward Middletown, covers 7,000 acres and the 4000-foot-high hilltop of Mt. St. Helena west of the highway beyond the area where Robert Louis Stevenson lived and recuperated. The St. Helena mountaintop is the vision-free location of short wave transmission relays for several senders.

East of the highway is the main ranch area. Hills and wooded areas lie to the east with old mercury mines, sloping to orchards and market garden areas and emerging springs before the highway.

Each of the five sons of this remarkable family has built a serviceable and pleasant, but not a lavish, abode scattered through the area between the easterly hills and the highway. A swimming pool and tennis court are present, and homes for the relations and for the maintenance manager. John (third son) and Putnam (fourth son), a gracious and thoughtful lawyer living in San Francisco, shoulder most of the decision making and enterprise operations.

Sources of income are limited, select timber cutting in the high ground to the east, hunting area permits in the east, and walnut orchards, Christmas trees, vegetable gardens in the flat slopes to the west, and more productive, the pure spring water emerging from the east slopes in the lower ground to the west. Care is taken to avoid

sedimentation (a problem) and the water is bottled and shipped. Also the rentals for the transmission towers on Mt. St. Helena provide appreciable income. But it is doubtful if the sources cover the considerable upkeep and taxation. But to visit and stay there in the still natural surroundings apart from the throbbing milieu is a rejuvenation.

So this is an introduction and background to a remarkable and admirable man of a remarkable family rooted in the best of family and traditions. Capable, patient and controlled despite some setbacks, never losing temper, never blaming fate, always trying to improve conditions and life for better, and for others. Of high honor and integrity, always the simplest and most efficient policy.

Arthur Brant
Director of Research (retired),
Newmont Exploration Co.

Tucson, AZ
October 1997

INTERVIEW HISTORY by Eleanor Swent

John Livermore, the geologist credited with discovering the Carlin Mine which started the Nevada gold rush of the 1960s, was of course on the initial list of prospective interviewees for the oral history series on Western Mining in the Twentieth Century. The advisor who first proposed his name cautioned that Livermore's elusive habits could make interviewing him difficult, but persistence would add a valuable chapter to the documentation of contemporary mining. When the interviews began, John said he expected the most exciting part of his career to be in the future; indeed, as this is being written, he has formed a new exploration partnership, bought a new 4-wheel-drive vehicle, and is happily calling himself a prospector once more. During the years that this interview was being processed, his business card changed, identifying him with Cordex, Rayrock, or Public Resource Associates, but one designation remained constant--"Geologist." When forced to stay in town, he stayed fit for field work by not using the elevator to his 18th-floor apartment.

The letter inviting him to participate in the project was sent in December 1990 after he visited our office and agreed to be interviewed. In October 1991 he sent a resume to aid my research. The first interviews were held on 28 May, 7 June, and 31 August 1992, at my home in Piedmont as John was en route from the Oakland airport to Montesol, his ranch home in Napa County. The fourth interview was conducted by Maurice Fuerstenau, Echo Bay Professor of Metallurgy at the University of Nevada-Reno, at the offices of Public Resource Associates in Reno on 20 January 1997. I conducted the fifth interview at my home on 12 April 1997, and the sixth interview at Montesol on 29 July 1997. The final brief interview was conducted in his office in Reno on 14 January 2000.

Notwithstanding his reluctance to submit to the constraints of the oral history process, John Livermore was articulate and forthcoming as an interviewee, and enthusiastic about the overall goal of the project, to preserve mining history. He shared his own Napa County historical research and took me on tours of the Carlin area and the Dee Mine in Nevada as well as the Corona Mine and Knoxville Mining District in Napa County.

In his interview, he tells of growing up in the legendary Livermore family, and of its mining heritage, of geology studies at Stanford, working for the USGS [United States Geological Survey], and serving in World War II in the U.S. Navy in the Pacific theater. After the war, he obtained a commercial pilot's license and worked as a contract miner as well as a mine geologist. A period spent working for a friend at the Standard Mine in Nevada convinced him that there was a potential for gold discoveries in Nevada, an idea which he clung to

through years of working as a geologist for Newmont Mining Company in Canada, Africa, and Europe; he became president of Newmont's Canadian subsidiary before leaving to work as an independent exploration geologist.

Geologist M.A. Kaufman, in his memoir, *Mountains of Ore and Rivers of Gold*, says that the Carlin discovery was "undoubtedly a masterpiece of geological work." John Livermore's own account reveals the painstaking, tedious study and work that were involved. This adds another dimension to the official Nevada Bureau of Mines and Geology report and many magazine and newspaper articles on this topic which have been written through the years.

He tells in his oral history of forming exploration ventures and developing a number of major gold mines in Nevada and elsewhere. In addition to the Carlin discovery, he has had other significant successes. He has been a generous and usually anonymous supporter of many cultural and charitable projects in his adopted state of Nevada as well as his native California. Through his Public Resource Associates, he supports activities to protect or enhance the environment. He has also been an active mediator in mining industry negotiations regarding the federal General Mining Law. He was one of eight inductees (and the only living one) inducted into the National Mining Hall of Fame in 2000. He has also been admitted to the American Mining Hall of Fame of the Southwest Mining Foundation, and is the only person to be honored in both halls of fame.

John is very tall, 6' 5", and handsome; during the years that this oral history was in process, he passed his eightieth birthday and began at last to show some trace of gray hair. A bachelor, he is much interested in his nieces and nephews and their children. He has an apartment in Reno and a house at Montesol, the family ranch near Calistoga, California, but is not often found at either of these homes. He maintains offices in Reno and San Francisco, where messages may be left. He seldom writes or answers letters, but usually returns phone calls. He doesn't carry a briefcase; many papers are kept in his car, along with his geologist's pick and a suitcase which is never unpacked. He has a prodigious memory and never referred to notes during the interviews. In an article in New Yorker magazine, April 24, 1989, entitled "Invisible Gold", John Seabrook wrote of John Livermore, "Despite his talent for finding ore deposits, he is forever forgetting and losing things.... Nevertheless, he has a phenomenal memory for rocks."

The tapes were transcribed in the Regional Oral History Office, lightly edited, and in August 1996 a partial transcript was sent to John Livermore for review. In May 1997 the transcript of the fourth interview was sent to both Maurice Fuerstenau and John Livermore for review. Fuerstenau reviewed it and returned it within a month with no

changes. John Livermore's transcript was returned in March 1998 with a few small additions and some changes, most of which were to consolidate duplicated material. The interviews were corrected, amended, and indexed at our office. A final typed transcript was sent to John Livermore for further review which resulted in minor changes and some deletion of repeated material. The tapes are deposited in The Bancroft Library and are available for study. Supplementary documents in The Bancroft Library include reports by J. Alan Coope on the discovery of the Carlin Mine.

Introductions were provided by colleagues Arthur A. Brant, retired director of research for Newmont Mining Company, and Andy B. Wallace, Livermore's partner in Cordex Exploration.

John Livermore is the third of the five distinguished Livermore brothers to complete an oral history for the Regional Oral History Office. His brother Norman "Ike" Livermore was interviewed in 1983 about his experiences as a packer in the High Sierra and as a director of the Sierra Club, and his service as Secretary for Resources for California during Ronald Reagan's governorship. His brother George Livermore in an oral history completed in 2000 documents Livermore family history and his career as an architect in San Francisco.

The Regional Oral History Office was established in 1954 to record the lives of persons who have contributed significantly to the history of California and the West. The office is a division of The Bancroft Library and is under the direction of Willa K. Baum.

Eleanor Swent, Senior Editor

June 2000
Regional Oral History Office
The Bancroft Library
University of California, Berkeley

Regional Oral History Office
Room 486 The Bancroft Library

University of California
Berkeley, California 94720

BIOGRAPHICAL INFORMATION

(Please write clearly. Use black ink.)

Your full name John Sealy Livermore

Date of birth April 16, 1918 Birthplace San Francisco, CA

Father's full name Norman Bowes Livermore

Occupation Civil Engineer Birthplace Oakland, CA

Mother's full name Caroline Sealy Livermore

Occupation Community activist Birthplace Galveston TX

Your spouse

Occupation Birthplace

Your children

Where did you grow up? San Francisco

Present community Reno, NV

Education Stanford University, A.B. Geology

Occupation(s) Geologist prospector

Areas of expertise Mineral exploration

Other interests or activities Awards: Medal of Merit, Mining Foundation of the Southwest; Distinguished Nevadan, University of Nevada, Reno. D. W. Keeling Award, S.M.E.

Organizations in which you are active President, Public Resources Assoc. Partner, Cordilleran Exploration Co

## I FAMILY BACKGROUND

[Interview 1: May 28, 1992] ##[1]

### Great-Grandfather Horatio Gates Livermore, 1850

Swent: You were just saying that you represent the fourth generation in the family that has had a connection with mining.

Livermore: In California, in the West, yes. My great-grandfather came out from Boston. They weren't mining back there. I'm not sure what business he was in in Boston, actually.

But anyway, I think it started in California with my great-grandfather, who came out in 1850. He started out in 1849, but he got held up somehow or other in Utah, like a lot of people, I guess, so he didn't actually make it to California until later. And he was not a young person; he was in his fifties, I think. And the unusual part about him was, he came out before his own children. Usually it's the other way around: the young people came out and brought their parents out. But he was quite an enterprising fellow, and he came out and settled in Big Bar, I believe, on the American River above Georgetown, and tried some placering up there.

But, I guess like most people who came out here, he didn't make his fortune, and he gave up on mining fairly early. Then he moved on to Georgetown and he got into the logging business. At one point, actually, he was a state senator.

Then, later--this is kind of interesting--his son came out, but he was smart. He didn't come out until he had an assured job in San Francisco. He worked for a drug company called the Redington Company in Boston. They had opened a

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[1]## This symbol indicates that a tape or tape segment has begun or ended. A guide to the tapes follows the transcript.

branch office in San Francisco, so he came out in 1856, and started working for this company.

## Grandfather Horatio Putnam Livermore

Swent: What was this grandfather's name?

Livermore: My great-grandfather was Horatio Gates Livermore, and my grandfather was Horatio Putnam Livermore.

Swent: Horatio Gates Livermore and Horatio Putnam Livermore; wonderful New England names, aren't they?

Livermore: They are, yes.

Swent: So he worked for the Redington Drug Company.

Livermore: Yes, and it was interesting, because when he came out, his father was up in Georgetown. It took a long time for them to get together. I think it was something like six months before they finally got together.

Swent: Well, it wasn't easy. That was a long ways away.

Livermore: Right. But then, my grandfather, through this drug company--one of the products they were selling was mercury. This was used, of course, in the mines to amalgamate gold and silver. So an opportunity came along where he decided, rather than just brokering mercury, to try to acquire a source of mercury.

## The Redington Mercury Mine

Livermore: So he got interested and involved in the development of a mine up in Napa County called the Redington Mine, which had been purchased from the XLCR in the 1860s. That was quite a profitable mine. His brother, who was Charles Livermore, actually managed the mine.

The interesting thing is, this mine is really not very far from our present ranch; it's only about ten miles away as the crow flies.

A lot of their marketing for mercury was in the Virginia City, Nevada, mines for use in amalgamation. In Virginia City, they opened a branch office and my great-uncle, Charles Livermore, went there in 1863, I think. He had a small apothecary store there, in partnership with a Mr. Rice, which didn't last very long.

## Great-Uncle Charles Livermore; The Livermore Furnace

Livermore: I guess it was after that that he went down and started managing the Redington Quicksilver Mine. He was an interesting fellow, because he was kind of an inventor; although not trained as an engineer, he tried to develop new methods of recovery of mercury. In fact, he designed a certain type of furnace which was called the Livermore furnace, which is written up in the literature as a kind of modification of the type of furnace they had for roasting the mercury ore.

So anyway, that was really the first real mining venture in my family, that was successful, at least. But that sort of played out in the 1880s. When Virginia City declined, then the mercury market petered out. I think the ore body petered out, too, so the mine was closed down.

Swent: Was there any connection with the mercury mines down at New Almaden?

Livermore: No. I think they were active at that time, of course, and New Almaden was a really big one. Redington was a good mine; it was quite rich. For about ten years or so it was quite profitable, but it didn't have the total production that the New Almaden Mine did. The Oat Hill Mine, which we own at the present time--it's just ten miles away--was an even larger producer, actually.

Swent: Ten miles away from what?

Livermore: From the Redington.

Swent: And you still have that?

Livermore: Yes, and that was actually discovered in 1872 and operated until 1910, and later in the thirties and forties, so that would be another period, you might say, in our history.[1]

The Oat Hill came along much later, when my father bought the property adjoining our ranch. But we just leased that, and we weren't actually operating the mine like my grandfather was. So that was really the only mining venture until I came along.[2]

[the following information was added later]

Swent: Please tell more about the Redington Mine.

Livermore: Knox and Osborn were the two early ones up there. The Knox-Osborn furnace, of course, I think they invented that. The XLCR was staked in June, 1862. Discovery was in 1861. They came in very shortly after that, within the next couple of years. [reading from a document] Most of their stock was bought by the Redington Company and Livermore. They were partners. This was H.P. Actually, of course, we could say a lot more about H.P. too. We could just go on and on forever.

Swent: This is your chance to get it in the record, John.

Livermore: Well, George [Livermore] has done one [oral history] and I always thought this was more of the mining career. A lot of this old history has been written up a number of times.[3]

Swent: All right. Wasn't the Redington also called the XLCR?

Livermore: It was originally called the XLCR.

Swent: Somebody told me the L in XLCR was for Livermore, so I think he was already involved at an early stage.

Livermore: Let me go through this. I did some very recent stuff in here. In 1862 the claim was staked by Redington et al. That was that great big claim. Then they came in later; after the 1872

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[1]See the oral history with William Kritikos in the McLaughlin Mine/ Knoxville District oral history project, Regional Oral History Office, The Bancroft Library, University of California, Berkeley, in process 1998.

[2]See James William Wilder, "Owner of One Shot Mining Company: Manhattan Mercury Mine, 1965-1981," Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 1996, pp. 109-110.

[3]See George S. Livermore, "Architect George Livermore Reminisces about the Pioneering Livermore Family: 1850-1999," Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 1999.

Mining Law, they came in an relocated it with the proper claims, 1500 by 600. That was in 1875, H. P. Livermore. That was a restake of the earlier one in 1862.

Swent: It says it was in the Quicksilver District.

Livermore: The mine was called the Redington.

Swent: Sometimes it was called the Boston, wasn't it?

Livermore: That was later. The Oat Hill company (called Napa Consolidated Quicksilver Mining Company) took over the Knoxville mine after Livermore and Redington sold. The company was headquartered in Boston and was often referred to as the Boston Company. Actually, I was down at the [Napa County] court house and got some interesting stuff. I keep going back and forth [from Reno to Napa]; every time I go by the court house I stop in. One of the early books, unfortunately, the first claim book, they have taken in to the printer to be redone so it is not available. [leafs through notes]

Here is the deed from Knox to Livermore in 1863. Claim located in June, 1862, known as the Lake Mine. That was the first name of it, the Lake Mining Company.

I was just in the court house recently and I traced it all out. I guess you're right; he was in it already with the XLCR. X was for Knox, C for Charles Osborn, L for Livermore, and R for Redington.

Swent: Was there a Redington person?

Livermore: Oh, yes. He was sent out as the son--I think young Redington was sent out to San Francisco. He established the Redington Company in San Francisco and H.P. came out to work for him. So they were partners. And actually I guess he started out as an employee, but he was a smart fellow and I don't know what kind of resources he had, but eventually he became a partner. Redington was the senior guy and H.P. was sort of working his way up; I don't know the details on that. So Redington for a long time was the lead man and they were in partnership. For instance, down in Bakersfield they were also in partnership together, so they were in partnership in a lot of different things.

But then of course at some point I think H.P. sort of took over the Redington Mine because his brother was managing it, so Redington was a senior partner, always in the picture.

They purchased the mine from Knox and Osborn, I guess. The people even before Knox and Osborn staked the first claim. I have that in here somewhere. Did you get that in your research?

Swent: No, I haven't gone back that far.

Livermore: I of course try to go back. I always like to go back to the original prospector, being a prospector myself; I always like to know who the first people on the ground were. Okay, here it is: [reading] "The original claim was staked in December 16, 1861, by Seth Dunham and L. D. Jones." But neither of them are in the XLCR, so they must have been bought out early by Knox and Osborn.

Swent: December, 1861, and then the XLCR was June, 1862, so that's only six months later.

Livermore: Yes, it all happened pretty quick. And it's interesting that H.P. must have gotten onto it very soon after discovery; I don't know how he happened to hear about it, but--.

Swent: Do you want to say any more about the apothecary shop in Virginia City?

Livermore: He was in partnership with Rice. My great-uncle Charles went there, established the store in 1863 in partnership with Rice; it was called Rice and Livermore.

They sold all sorts of patent remedies, paints, oils.

Swent: And assay supplies. That was interesting. You could tell more about that shop.

Livermore: Yes, but you have to draw the line somewhere.

Swent: I think you ought to say more about the Oat Hill Mine.

Livermore: It wasn't discovered until 1872; it was later. We purchased the property in the late 1920s and it did operate again in the 1940s when we leased to Gould. And then later it was operated by Bill Kritikos when the price of mercury went up again in the 1960s.

Swent: Did you go out and visit the mine?

Livermore: Oh, yes, we used to go out and visit when it was operating during the war. I remember going out there and they had a big vat of mercury and we would stick our hands in and just play with that mercury. Of course now, everybody says it's so dangerous that you can't even touch mercury; that's kind of ridiculous, of course.

[end of insert]

Father Norman B. Livermore, Sr.

Livermore: My father was not involved in mines really except indirectly. He was a civil engineer. He was involved in construction and hydraulic projects; general engineering.

Swent: He lived in San Francisco most of the time?

Livermore: He was born in Oakland. Do you know where the Claremont Country Club is?

Swent: Yes.

Livermore: That's where he was born. Then they moved to San Francisco.

Swent: And his name?

Livermore: He was Norman B. Livermore, Sr.

Swent: And you were born in San Francisco?

Livermore: Yes, in 1918, a war baby, born while my father was in France. We lived in San Francisco until 1930, and then we moved to Marin County.

Swent: When did your father get involved in ranching?

Livermore: My grandfather bought the ranch in 1880, as a matter of fact. My grandmother had tuberculosis, and at that time there was a TB sanitarium up there. It was up out of the fog zone, and in those days the only cure for tuberculosis was sunshine and rest. The sanitarium was run by a very interesting man by the name of Dr. Blake, who was one of the very early doctors in California. He did a lot of early medical research, and was president of the California Academy of Sciences at one time before it was in Golden Gate Park.

So my grandmother went up there, and actually died there, up at the ranch, at a fairly young age. My grandfather first bought eight acres there and liked the area, and after she died, he remarried. He liked the area so much he gradually just started acquiring more land. Then my father bought more land, and so on.

Over the years, we just enlarged the place, but it started there in 1880. So we've been there well over a hundred years now, which is quite a while.

Swent: Was there any talk of mining in your family when you were a child?

Livermore: Well, there always was. I think while my father was a civil engineer--I think he felt like a lot of people that mining was kind of a boom-and-bust business. I think he was always interested in it, but I don't think he ever wanted to invest in mining. He thought it was really too uncertain to raise a family on. So he never really dabbled in mining too much, although he was a director of Natomas Company which had extensive placer mining interests. He was in the machinery business, and he used to sell big equipment, steam shovels and things like that. He sold equipment to the mines. Railroad locomotives; he was the distributor for big railroad locomotives and steam shovels and things like that. So he had a little bit of involvement in mining.

I remember he used to talk about going over to the mines at Tonopah, Nevada, selling things. But he never got personally involved in mining.

But he always was interested in them, and I guess I sort of heard about mining. We had a mine on our property, so it always intrigued me. It seemed like kind of a natural thing. While I was at Stanford I got interested in geology and mining engineering.

## II EDUCATION AND EARLY TRAINING

### Thacher School, Ojai, California, 1932 to 1935

Swent: Where did you go to school before Stanford?

Livermore: After Miss Paul's I went to the Damon School in San Francisco and Tamalpais School in San Rafael, and then to the Thacher School down in Ojai Valley, in southern California. Private school.

Swent: Was there good science instruction there?

Livermore: Very good, yes. Excellent school. It's an unusual school, because everybody had a horse. So we would all do a lot of horseback riding and camping.

Swent: Good training for an outdoor life?

Livermore: That's right. So I got used to an outdoor life, at school and up at the ranch. I soon decided that I wanted some career that would be in the outdoors. That's how I just sort of gradually got into geology.

### Stanford University, 1936 to 1940

#### Professor of Geology Aaron Waters

Swent: Who were some of your teachers at Stanford?

Livermore: Aaron Waters was one of the teachers who I thought a lot of. I think he had more to do with getting me into geology; he was a wonderful lecturer and quite a remarkable man. I actually

started off in engineering; then I started taking a few geology courses, and I really found I was more interested in the exploration side of mining rather than the operating. He got me a job with the U.S. Geological Survey when I was out of school, and it was an interesting start.

Mike Kildale was one of the other professors. He taught economic geology and summer geology. Ben Page, who's an amazing guy. He's still there as an emeritus professor. Gosh, he must be over eighty years old.

[the following section was added later]

## Professor of History Wallace Sterling

Swent: You mentioned a special history course with Wallace Sterling; what was that?

Livermore: Well, we always had to take a required course in Western Civilization; every freshman had to take that. And some were selected on some basis--I don't remember exactly the basis--to have these smaller special studies classes as part of the course, and I think one quarter I was involved in one of those smaller seminar classes out at Wallace's house and you know he was a remarkable teacher. I never thought at the time he was going to become president [of Stanford].

[end of insert]

Swent: Did you have any particularly interesting summer jobs or field courses?

Livermore: I had some interesting jobs. Even before Stanford, when I was in high school, I worked in the Sierra Nevada packing mules.

My oldest brother, Norman, was in the mule packing business.[1] He got very fascinated with this. So I worked for him as a packer--not for him, but for the same outfit that he was associated with. So that was an interesting experience in the summertime.

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[1]See Norman B. Livermore, Jr., "Man in the Middle: High Sierra Packer, Timberman, Conservationist, and California Resources Secretary," Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 1983.

## Oil Reconnaissance in Alaska, 1938

Livermore: Then, when I was in college, I had an opportunity to go to southwestern Alaska on an oil exploration party. That got me a little more interested in geology. I had hardly taken any geology courses at that time.

That was 1938. And it was interesting, because they were doing a lot of reconnaissance along the coast, and in those days there was no helicopter to move supplies. We were crossing a lot of rivers, along the edge of glaciers there. The country is very wet, and we couldn't use horses.

So the only way to haul supplies was on your back. There were six of us; we were the human pack mules. We had to move about a ton of stuff from camp to camp, so our job was to move all that stuff on our backs, which was quite an experience.

Swent: Was this for an oil company?

Livermore: This was a joint venture of Union Oil, Tidewater Associated, and Standard of California. I really enjoyed that. We saw some beautiful country, and had a lot of experiences with bears and so on.

Then the summer after that, I worked in the Ventura Oil Fields. That was 1939.

## Ventura Oilfields, 1939

Swent: What company was that?

Livermore: That was with the Tidewater Associated.

Swent: What did you do there?

Livermore: We were digging ditches. [laughter] That was a good workout. It was blazing hot there; about 110 degrees in the shade. At that time they used steam boilers to run the drill rig. We were digging ditches for pipelines to provide steam for these boilers. The combination of the normal heat and the heat from the boilers--boy, it was something. But I enjoyed it; it was good hard physical work.

Swent: And they needed Stanford geology students to do this?

Livermore: Well, yes. [laughter] Well, that was good experience for me. I wasn't a geologist then. Then they wanted me to go to work as a roughneck on one of the drill rigs. I was sort of tempted, but I decided to go back to school.

## Summer Geology with Professor Mike Kildale, 1940

Livermore: Then the next summer, in 1940, I had summer geology. That was with Mike Kildale. In those days, they would split geology: half on the soft rocks, the oil type of rocks, and the second half on the hard rocks. We went down to King City and were mapping an area including the Monterey formation the first half of the summer.

And then the second half, we went to Nevada, up near the Winnemucca area, and we mapped a mine there, doing a large map of the surface geology and underground workings. That was very good experience. Stanford has always had a good, very strong field course in geology that lasted the whole summer. It wasn't just three or four weeks like a lot of the courses are today. We did surveying and triangulation, plus very thorough underground mapping.

Swent: What was the mine that you mapped?

Livermore: It was called the West Coast Mine, outside of Winnemucca. It was a lead-zinc-silver mine. It was actually operating then, but it didn't operate very long. It turned out that it wasn't economic. At the time, it looked pretty good.

Swent: Had it been mapped before?

Livermore: No, it hadn't been mapped at all.

Swent: So this was more than just a little exercise for you.

Livermore: It was a nice gift for the mining company, who ended up with a good geological map, both surface and underground. That was very interesting; I really learned a lot.

The Getchell Deposit, Nevada

Livermore: As part of this course, we visited a number of operating mines in the Winnemucca area. One particular mine which attracted my attention was the Getchell Mine, which at that time was a very successful open pit gold mine. I was interested in the story of how the deposit was discovered.

The original Getchell outcrop was a very large, bold mass of silicified iron-stained material, which usually would catch a prospector's eye.

The story was that it was right on a main trail that a lot of prospectors and other people had passed for years, and they would bang off chunks of rock and crush them up and pan them, which was the standard way of prospecting in those days, and they never would get any "colors" of gold. This went on for quite a few years.

But somebody had the bright idea much later in the thirties to send a sample in for assay. Well, it turned out there was gold in this rock, and this big mass of silicified material was all gold ore. But the gold was so fine that it would float out of the pan and not be detected, which was the reason it wasn't discovered until the thirties.

That stuck in my mind, because I always thought, oh, that was kind of interesting. This is the type of gold that wouldn't pan, and maybe there were other similar occurrences that the old-timers might have missed. I always remembered this and I followed up on this later on and it turned out of course that this was the same type of mineralization as the Carlin discovery.

Swent: The Getchell was also famous for being very refractory, wasn't it?

Livermore: Well, it was refractory when they got down in the sulfide zone. The oxide zone leached very well. In fact, that was a very profitable mine in the early years, when I was there in 1940. But later, after the war, they got down into the unoxidized material, and then they had a lot of problems with arsenic, and it wasn't nearly as profitable.

A lot of experts tried to solve the metallurgical problem. But it was a tough ore, and it's still a tough ore. They're mining it today, and it's still very, very difficult. They have to use a pressure-leaching system which is very expensive.

## III WORLD WAR II, IN AND OUT OF UNIFORM

### U.S. Geological Survey Strategic Minerals Program, 1940

Livermore: I graduated from Stanford in September, 1940, and Professor Waters got me a job at the U.S. Geological Survey. I was involved in what they called the strategic minerals program. The war had started in Europe. They had a program of evaluating strategic mineral deposits, which was very good, because it had more of an economic orientation than most of the USGS projects do.

I was involved in chromite investigations quite a bit. We were mapping deposits in central and northern California and southern Oregon, and also I mapped a manganese property down by the Colorado River.

Swent: These were strategic in what sense?

Livermore: Well, strategic in the sense that we were short of them in wartime, that they were trying to develop domestic reserves of certain metals. Both chromium and manganese as you know have very important wartime uses. We don't have a very good supply of them, so they were trying to develop even marginal sources in case of emergency.

Swent: Sources that normally wouldn't be economical?

Livermore: That's right. And tungsten is another one we did a little work on.

Swent: If they had to be imported, the source might be cut off.

Livermore: Well, that's right. So that was a good program, because it had a strong economic orientation, which is why it was interesting.

Swent: Were any of these ever developed?

Livermore: No. None of them really were. Well, they were marginal. The chromite that we have in this area is a low-quality chromite. It can't compete with good Turkish and South African chromite. It would have only been used if, as you say, the source of supply had been cut off. And it never was completely cut off, so those mines never were put into production.

## Basic Magnesium Plant, Henderson, Nevada, 1941

Livermore: But then an interesting opportunity came along. This was in late 1941. They were building a magnesium plant in Las Vegas, Nevada. This was a war program, because we had no source of magnesium at that time, oddly enough. That was a very important war metal for airplanes and fire bombs. That was when the Battle of Britain was going on. There was a tremendous crash program to develop a source of magnesium. In Nevada, there was a magnesite deposit nearby. Also, the Hoover (Boulder) Dam had been built by that time, so there was a combination of a magnesite deposit in central Nevada, and cheap power; this was a process that required a lot of electricity.

Because of that, this plant was being built there south of Las Vegas. This was more of an engineering job, but I was lucky enough to get involved in it. The plant was a duplicate of one in England. They were way ahead of us at that time; they had an operating plant. A group of us--about thirty of us--were sent over to England to familiarize ourselves with this process while they were building the plant. Then we would come back to Las Vegas and get the plant going.

## Duplicating a Plant Near Manchester, England, 1942

Livermore: The first idea was that we were to go over in a bomber, so that sounded kind of intriguing. But as it turned out, we didn't. We went over in a troop ship and were based in a little town called Clifton outside of Manchester. I was over there for about six months, I guess.

It was very interesting, because we were there during the blackout, and we had one or two air raids. It was after the big Battle of Britain. We had to learn to get around in complete blackout, which is kind of amazing, because the traffic continued; the buses all ran, and everything. You had

a little slit of light on the headlight. Amazing how life went on. We'd go down to Manchester, take the bus, go to a movie or something, in the complete blackout.

Swent: What was the exact date of this time?

Livermore: I went over in January, 1942, just after Pearl Harbor, and stayed until September. I was already committed to this job when Pearl Harbor was attacked.

Swent: The voyage across the Atlantic must have been very dangerous.

Livermore: Well, it was, yes. We had several submarine scares going across the Atlantic. We went in a big convoy with destroyer escorts. It was quite a bit of fun. That was the height of the submarine danger.

Then I came back to Las Vegas. By that time--

Swent: Just one more question. Were you still employed by USGS?

Livermore: Oh, no, that was different. I had resigned from USGS. This was a company called Basic Magnesium Incorporated, a private corporation.

Swent: This was one of those companies financed by the RFC?

Livermore: Oh, yes. This whole thing was financed by--I think by the Reconstruction Finance Corporation or some agency. Yes, this was completely government. This was such a crash program that they didn't want to make any mistakes. They wanted to build a plant ten times as big as the one in England. They wanted to make absolutely sure everything would work, so instead of enlarging the plant ten times, they just built ten of them right in a row, exactly identical. And they're still there south of Las Vegas, at Henderson, if you know where that is.

Swent: And did they work?

Livermore: They worked.

One other thing that was interesting about the process is that it required peat.

Swent: There is not much of that in the Las Vegas desert.

Livermore: So they had to scurry around and find a source of peat, and finally ended up hauling peat all the way from eastern Canada to Las Vegas, tying up the entire peat production. That was

quite expensive. But they weren't going to take any chances, as they had to duplicate the process exactly. There were big piles of peat right out in the middle of the desert.

But later they found that sawdust worked almost as well.

Swent: It sounds like a bit of overkill to send thirty people over to England.

Livermore: Well, there were all these different departments; it was a very complex process. Part of it was crushing, preparing the stuff, and then there was a chemical process, and then there was an electrolytic process. A lot of different skills were required, so it took a lot of people.

Swent: What part were you involved with?

Livermore: I was in what they called the preparation part, which was crushing the material, preparing and crushing the ore, and mixing of the different materials. We would make pellets of peat and coal. A magnesium chloride solution was added to the pellets and then they were heated in a furnace. The reason for the peat was to provide porosity. The peat would burn out, and then the pellet would be very porous, and amenable to the later chlorination process.

It turned out that this was not one of the better methods for making magnesium. They finally found out there was a method that was cheaper, so the plant did not operate throughout the entire war.

I could have stayed there indefinitely, but at this point I was anxious to get into the service, so when I felt I had fulfilled my obligation there, I resigned and signed up in the navy.

## Serving in the Navy Civil Engineering Corps, 1943 to 1946 ##

Swent: Did you go in as an officer?

Livermore: I went into the V-7 program at Notre Dame University. They had what they called the ninety-day wonders, because any college graduate could take this ninety-day training and come out as an officer.

When I signed up, I thought that I'd be put on a ship. But because of my engineering experience and the fact that I could not pass the color perception test, I was commissioned as an ensign in the Civil Engineering Corps, which a lot of people don't even know exists. It is the construction part of the navy, building civil works. I was assigned to the Seabees [construction battalions].

I was kind of disappointed, because I really thought I'd be on a ship. But actually, it worked out pretty well. I had a very interesting experience, and I think it was probably better than being on a ship, because a lot of my friends on ships were bored a lot of the time, unless they were actually in battle.

Later, I had training with the Marines in Virginia. One of my assignments was as a drill instructor--I don't know how I got involved in that. At one point, I was drilling WAVES [Women Appointed for Volunteer Emergency Service], teaching the WAVES close-order drills. They learned faster than the men. That was kind of interesting. But I didn't like it very much because I was anxious to get overseas.

Finally I did get an overseas assignment, and I was sent to New Guinea. I spent a year there, principally at a base called Milne Bay. We built very large facilities there, an airfield, warehouses, and docks. It was an interesting experience because I learned a lot about practical construction. We were very busy, so as it turned out, it worked out well for me.

Swent: What were the dates of that?

Livermore: That would have been 1943, through the end of 1943, something like that.

Swent: The fighting by then had ended in that area?

Livermore: Yes, the combat was farther north. Then in 1943, they were getting ready for [General Douglas] MacArthur's first landing in the Philippines. We were involved in that. We landed as a Seabee group with MacArthur at Tacloban; if you remember, that's where he first returned to the Philippines, on the island of Leyte.

We were set to build a large base near Tacloban which had been planned from New Guinea with aerial photographs.

We investigated where we were supposed to make this big base, and found that the photographic interpretation was a little bit off; it turned out to be an enormous swamp. [laughter]

We had a kind of interesting experience there, landing with MacArthur. This was the famous incident where he could have walked off on dry land from a landing craft, but he had the skipper pull the craft slightly offshore so he could wade in and make a better picture for the photographers.

We had a little bit of a skirmish, even though we were not supposed to be a combat unit. Some Japanese paratroopers landed near our camp one time, but we didn't have any really serious action. We were just a little behind the first wave.

They scurried around trying to find where we could build this planned base. Finally we moved over to another nearby island called Samar. There, the conditions were good, and we built another very large installation, with airfields, a water system, docks, and so on. Again, I got some good construction experience.

Later, we were being staged to go into Japan; that was our next move. But the war ended, so that was the end of that.

Swent: How did you feel about the atomic bomb at that time?

Livermore: Well, we didn't hear too much about it, really, other than that it was a fantastic bomb; we didn't get too many details about it. I guess we heard about a number of people killed, but most people's first reaction was that it was ending the war, and we'd all get back home.

That was the end of our supposed trip to Japan.

When I came back, because I was single, I didn't have many points for discharge. I wasn't one of the first back, and when I did get back, I still had to spend about six months in California at a Seabee base down south of Ventura, at Port Hueneme, to earn sufficient points.

Also, I hadn't gone into service until later. Actually when I was in Stanford, in 1940, my dad had heard about this V-7 program, and said, "You'd better go and sign up for this, because you can be made an officer in ninety days." So I took the test and that's when I flunked that color perception test, which just absolutely amazed me; I didn't realize I had any

problem at all. This meant I could not be accepted into the V-7 program [at that time].

Actually, it was very fortunate, because the friends of mine who had signed up in 1940 were called into the service in 1941. So they were in for five years. If I had done this, I would have missed out on some very interesting experiences. So in that sense it worked out pretty well.

Swent: Had your father been in the navy in the First World War?

Livermore: He was in the army. He wasn't young; I think he was forty-five years old or something like that. He had a bad hip, which he hurt in a horse accident as a young man. He didn't limp, but he couldn't squat down. They weren't going to let him in the army, but he just absolutely insisted, and he finally got in the army engineers. Actually, I was born when he was in France in 1918. A war baby.

Swent: The attitudes were different then, weren't they?

Livermore: Oh, yes. He was bound and determined to serve in the war.

Swent: So, you got out of the navy--.

Livermore: I had originally intended to maybe go back to graduate school, but by that time, six years had slipped by, and I just didn't feel like going back to school. I wanted to get on with my profession. In those days, Stanford wasn't even giving a B.S. [Bachelor of Science degree] for four years. So I ended up with just an A.B., a Bachelor of Arts.

## IV BEGINNING A CAREER IN FIELD GEOLOGY, 1946 TO 1952

### Mapping in Ouray and Cripple Creek, Colorado

Livermore: I decided just to start work. I never regretted it; I don't think I missed out on too much. Geology you sort of learn on the job. I looked around for jobs, and I finally took a job in Colorado, kind of a temporary summer job doing some mapping down in the San Juan Mountains, near Ouray, Colorado. Just mapping some property out here for some people in New York. It was kind of a small private company. That was just a summer job, and then I had another opportunity that came up in Cripple Creek, Colorado.

I went to Cripple Creek, and was working as a geologist at a company called El Paso Mines, Inc. They had quite an extensive program of underground development and exploration. They were trying to reopen the El Paso mine. They did spend quite a bit of money driving drifts and raises and looking for some of those high-grade Cripple Creek ore bodies.

Swent: That was gold?

Livermore: That was gold, yes, gold telluride. I guess the money finally ran out, and unfortunately our program was not very successful in finding any important ore bodies. But we did find some smaller ore bodies.

In the old Cripple Creek area there were dozens of mines, and they were all interconnected. One of my jobs was kind of looking around for new areas to prospect, so I enjoyed that, and I had a kind of road map to show where all the different workings were. I would go off by myself all day and then wander around, back in these old workings, climbing up and down raises. I was looking for certain geological features that the ore was associated with. I guess today people would have felt that was really pretty stupid, because nobody knew

where I was. If something had happened to me--[laughs]. I never thought anything about it. I really enjoyed it.

One of the things in Cripple Creek we had was very bad gas conditions; you had to be very careful; it was quite dangerous. They had areas where the oxygen was completely removed, and the air became very toxic; there had been several fatalities. I was very careful; I didn't take any chances.

Swent: How did you check?

Livermore: Well, I had a candle with me at all times to make sure that there was sufficient oxygen in the air to breathe.

## Contract Miner at El Paso Mine, 1947

Livermore: I decided I wanted to get some more practical experience, so right at the mine there, I became a miner, and worked with another fellow. We drove drifts and did contract mining. Since I knew the mine pretty well, at one point they offered leases on some of the areas that we had opened up, some of the smaller ore bodies. So this fellow and I, we had been contract drifting, and we took a lease. We mined some of these smaller ore bodies for a few months. Unfortunately, we didn't get rich out of it. I made wages; that's about all. It was a sort of an interesting experience. Then the whole mine shut down, so that was the end of that.

## Humphreys Gold Corporation; Mining Beach Sands in Florida, 1948

Livermore: I was looking around for jobs, and one came up in Florida, with a company called Humphreys Gold Corporation.[1] It wasn't a gold mine but it was kind of an interesting mine. It was beach sands containing heavy minerals with titanium in the form of ilmenite and rutile, plus zircon, and also there was a certain amount of monazite. We didn't produce that commercially, though; there was no market for it at that time.

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[1]See James V. Thompson, "Mining and Metallurgical Engineer: The Philippines Islands; Dorr, Humphreys, Kaiser Engineers Companies; 1940-1990s," Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 1992.

It was an interesting deposit, because it was practically on the outskirts of Jacksonville, on the beach. It was a dredging operation, and my job was running the exploratory drilling. We were drilling ahead of the dredge, blocking out reserves, so we had a kind of an unusual drill which was built there to drill down through the dune sands, which was kind of a difficult operation.

Swent: Tell a little bit about it; you had told me a couple of interesting stories about Mr. Humphreys.

Livermore: Well, yes. Mr. Humphreys was an interesting fellow. There were two brothers; one was an inventor, and the other was a businessman. They were a very good combination.

Mr. Humphreys the inventor--one of his inventions was a spiral, the Humphreys spiral, which was a very simple device. No mechanical moving parts.

The sand would circulate around the spiral and the heavy minerals would have a tendency--because of the difference in specific gravity--to settle into the center of the spiral. By cutting off the inside portion of the stream, we could concentrate large quantities of sand very quickly.

This was a very large operation. We were literally dredging I think a thousand tons an hour, something like that. They had a big battery of these spirals, and would produce a concentrate very cheaply, and that's really the only way that made this particular operation profitable.

Then that concentrate was dried, and they had a further refining process, which was an electrostatic process, to separate out the various heavy minerals. That was a very simple device; you wonder why somebody else hadn't thought about it sooner.

The other thing Humphreys invented--he was a fisherman--and of course fishing reels have their axis perpendicular to the pole. And often, there's a problem with backlash. Well, he had the bright idea, why not rotate that axis 90 degrees? The line would come off the top of the reel instead of the conventional position. That eliminated most of the backlash.

You know, inventors are amazing people. No one had ever thought of just simply turning the reel 90 degrees, and so that was his other great invention. Both of them very simple, very practical things, which no one had ever thought of.

He invented other things too; his head was continually in the clouds, like most inventors. But his brother was a hard-headed businessman, and between the two of them, they did very well. That Humphreys spiral was used in a lot of different mining applications.

Swent: You said they also had a special drill?

Livermore: Well, that's right. Sand is very hard to drill, because the walls cave in very readily. The normal drills just simply won't work. This was a very simple device. It just had a jet of water inside a casing. A heavy weight at the top of the water jet drove the casing down at the same time as the jet flushed out the sand from the bottom of the casing. They had attempted other methods which simply did not work; they tried to core it, or they tried to just drive it down, just bull it down, driving through the sand without a jet. We were down below the water table, and the sand would just cave in. But this system just worked beautifully. You could just go zooming right down.

Then the cuttings would wash out, and we'd save them. This machine was invented and built right there at the mine.

Also we had trouble driving across the sand dunes with the regular truck; you could easily get bogged down. So they designed special old military half-tracks with a drill mounted on them, and we'd drive them across the dunes, and do the drilling. The Humphreys group was a very imaginative organization.

Swent: So it was your job to find the sands that were productive and tell them where to dredge?

Livermore: Yes, and to block out the reserves, and how much overburden there was, and things like that. So that was an interesting job, and that lasted about a year.

## Getting a Commercial Pilot's License

Livermore: I had also another interesting opportunity, because there was an airfield about three or four miles away. I had the G.I. bill [Servicemen's Readjustment Act of 1944] available, so I thought, why don't I just use it to learn how to fly? So I'd go out to this airfield almost every day after work and on the weekends, and I started out thinking, well, instead of just

getting a private pilot's license, I might as well just go on and get a commercial license. Which meant 250 hours of flying. It's surprising how long it takes to get 250 hours of flying, a little bit at a time. One hour at a time, it took me almost a year to do it.

But I did get a commercial license. I never intended to be a commercial pilot, but it was just sort of something to achieve, and I thought I could use the ability later in prospecting around the country. It didn't quite work out that way.

Swent: You have not done a lot of flying?

Livermore: No, not much. I found it was inconvenient, because particularly in those early days, you couldn't rent cars at airports, or four-wheel-drive vehicles, and you'd go out to look at a prospect and you had no way of getting from the airport to where you wanted to go. So I thought it was better just to drive a car. I used to do a little flying, but it wasn't practical.

As part of the course for a commercial license, you have to do what they call "cross-country". It usually meant--to learn navigation--flying a triangle. Go up to one airport, to another airport, and back to the first airport. That taught you the airport procedures and navigation.

So I got the idea, for my cross-country, I'll literally fly across the country, and go home to California. So I did, and I had some very interesting experiences, because I was flying a tiny little plane. At full throttle, it would go about seventy miles an hour. I remember flying sometimes with a headwind over a freeway, and the cars on the freeway below would be passing me. [laughs] I couldn't keep up with the cars.

Swent: What kind of plane was it?

Livermore: It was an Aeronca. I had to stop about every 300 miles to refuel. So I made all kinds of stops all the way across the country.

I was coming from Tucson to Phoenix one time, and I didn't calculate the winds properly. I realized by the time I got into Phoenix it was going to be dark. I wasn't supposed to be flying after dark and I didn't have any lights or anything. There was no radio, of course.

There was an air field I could have landed at, a U.S. Air Force field. I said, "Oh, well, I'll just see if I can make it." So by the time I got into Phoenix, it was really dark, so I flew over the airport, and thought now what am I going to do? So I circled for a while, and I waited until a commercial plane came in, and I just kind of sneaked in behind it. [laughs] I landed, pulled right over into the taxiway, and the tower didn't even realize I had landed. [laughter]

But I finally made it out to California. The outstanding experience of the trip was on the way back, because I was hopping, hopping, hopping along. I was supposed to go to a town called Lafayette, Louisiana, and again, with a headwind, I realized I wasn't going to make it. So I looked on my map, and there was a little town out in the swamps in Louisiana called Thibodaux. So I said, okay, it showed an airport, service, and gas. It was a little off my route, but I made it over there, to Thibodaux, which is a little Cajun town. I circled and circled, and couldn't find the airport. Where is this airport? It said right on the map there's an airport.

So I was really out of gas by that time. There was a U.S. Air Force field nearby, but I didn't think I had fuel to get over to that. So I decided, well, I'll just have to make the best of it. I picked out the best field and came in as low over the fence as I could. I got down all right, but I was zooming across this field pretty fast, heading for a big pile of timber. I realized that I was going to crash into this pile of timber. So the only thing I could do was what they call ground loop, where you flip the plane around. Which did the job; the plane stopped, but it did a little bit of damage to the landing gear and the wing. So I was stuck there.

Anyway, I got out of the plane. I asked some of the local farmers, "There's supposed to be a field. What happened to the field?"

"Oh," he said, "they plowed it up last year and planted sugar cane." [laughter] So that was sort of interesting.

But then, I had the highlight of the trip. I went into this little town, which at that time was really very isolated. There were a lot of people who were speaking French. I was kind of the big event in town when I came in; in fact, there was an article about me in the newspaper. Oh, I had a great time there. They had a big dance that night. I had a lot of fun. I met a very pretty girl; her name was Durocher; she was related to Leo Durocher, the baseball player. I had to stay

around for two or three days while they brought a truck in to haul my plane out.

Swent: They couldn't repair it there?

Livermore: They couldn't repair it there. I finally went on my way, but it was too bad, because if I could have completed the cross-country, that would have been almost kind of a first, I think, with a little plane like that. So that kind of spoiled that. But that was an interesting experience.

Swent: Well, it could have had a tragic ending.

Livermore: Yes, I could have. But those little planes, of course, they land so slowly--

Swent: You weren't hurt at all?

Livermore: No, not at all.

Swent: And you did get the license.

Livermore: Oh, yes, I got my commercial license all right. I had a little problem with that again, because of this red and green perception business, but they gave me a special test. As I say, I had no radio, so we had to rely on lights, the red and green lights at the airport. Which I can see without any problem.

Then I decided I had had enough at Humphreys Gold, so I headed back West. That was the end of 1948.

## The Standard Mine

Livermore: I decided I wanted to head back West again, and that was at the end of 1948. I had a chance to work in Nevada, actually for Stuart Rawlings.

He was interested in mining, and he had various interests in Nevada and other places. He got involved in a gold mine in central Nevada near Lovelock. It had operated before the war, and they were forced to shut down with the L-208 order.[1]

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Swent: How did you happen to know Stu Rawlings? Had you been school friends?

Livermore: Oh, yes, we had known the family. My dad and his father were good friends, so we'd known the family for quite a while, yes.

Swent: Were you about the same age as Stu?

Livermore: Yes, about the same age. He's a little older than I am.

Swent: Had you gone to school together?

Livermore: No. He knew my older brother Norman better than he knew me; he was more his age. He was always interested in mining, of course like his father. He had a lot of interests in Nevada and California at that time. I had just been working in Florida and wanted to come back West, and somehow or other we got talking. He had this mine up at Standard, and they were

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[1]War Production Board order L-208, issued in October 1942, restricted production of "non-essential" mines.

short of ore at this mine so he hired me just to try to increase their ore reserves.

Shortly after the war, he and some other investors had reopened this mine, the Standard Mine near Lovelock.

They had a setback at the mine. The pit they were working in collapsed on them, and they were desperate for more ore.

There was another area where they had some mineralization, so they were looking for a geologist to direct a drilling program to try to enlarge the reserves in order to stay in production. So he hired me.

We did some churn drilling, and found some ore. But the mine was really sort of doomed already. It was a very, very low-grade mine, and they were not making much money. To develop this ore that we were finding would have involved quite a lot of stripping, and they just weren't generating enough money to continue. The mine shut down a few months after I arrived.

Swent: And the price of gold was still fixed at $35.

Livermore: Thirty-five dollars, right. And it was very, very low-grade. It was just a remarkable operation, using cyanide. I remember the mining costs were 40 cents a ton, the milling costs were 40 cents a ton, the overhead was about 40 cents a ton, and the tails were .01, which is about 40 cents--it leached very well. The break-even was $1.60. When we were mining ore that ran $2.50 a ton, then we were doing very well. Hard to believe.

The ore leached well with a very coarse grind; they got a 95 percent recovery. It was a beautiful ore for cyaniding; a brand new mill had been built before the war. But it just couldn't quite get going. The costs went up like most mines after the war, and they had to replace some of the equipment. They had this cave-in in one pit. They just couldn't quite make a go of it.

I was only there three or four months when the mine shut down. That was kind of my first test of open-pit gold mining in Nevada, and of course, that comes in later in the story. This was an interesting type of disseminated deposit, and I knew of a couple of others similar to it, such as the Getchell mentioned earlier, and it always kind of intrigued me that there must be other ore bodies like this in Nevada.

Swent: This was low-grade, but it was not fine, not microscopic?

Livermore: Yes, it was, it was microscopic. This was the type which later came to be known as Carlin type. But it wasn't identified at that time. It was a disseminated deposit, with just a little different characteristics than some of the more classic Carlin ores. The rocks were of a different age, but still I would classify it as Carlin type.

Swent: Where is the Standard?

Livermore: It's out north of Lovelock, just off Highway 80.

Prospecting ##

Livermore: After the mine closed, I decided to stay in Nevada and do some prospecting on my own. I was sort of footloose then. I soon realized that my real interest was prospecting, exploration and prospecting. So I decided, well, I'll just work as a prospector, for myself, and I can earn a little money maybe doing consulting work. I did work for Stu Rawlings; he had various odd jobs for me in Nevada and California in some of the properties he was involved in, and I had a few little mining projects, examinations, and then in my spare time I just prospected on my own. I picked up a couple of properties, none of which panned out.

Swent: You say you picked them up--

Livermore: I staked some. I got interested in a mineral called perlite, which was quite a hot item at that time; it's used in plaster. I located this deposit by doing some research in an old government publication. I went out and staked it, but I wasn't able to sell the property.[1]

Anyway, I enjoyed that. I traveled all around a lot of different areas, and sort of mixed up prospecting with a little consulting. One of the places I looked at was right at the area of the later Carlin discovery; not right on it, but nearby

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[1]For more on perlite, see John F. Havard, "Mining Engineer and Executive, 1935 to 1981," Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 1992.

where there was a little mine, a placer operation on Lynn Creek, which was actually only a mile away from the Carlin Mine. I don't know whether I actually walked over the Carlin ore body, but I was very close to it. So that was sort of interesting, a place where I came back to later.

Swent: When you're prospecting like this, how did people get in touch with you? Did you have an office?

Livermore: I had a pretty low budget; I wasn't making much money. After Standard, for a while I lived in the back yard of a friend of mine, in Lovelock; I had a shack there where I lived several months. And then I had a little place in Reno that was another little shack--in fact, my brother Norman came over, and he was really amused at the place I was living in. It was really a place just to store my stuff.

Even though I had several interesting jobs, I couldn't really make a living at it. At that time, no one was grubstaking prospectors. I enjoyed it; I just couldn't continue doing that. Later, of course, we hired prospectors and paid them a salary, but nobody was doing that in those days.

Swent: You were doing a lot of research; you weren't just out in the field indiscriminately banging on the rocks.

Livermore: Well, I was doing research in the literature, like any prospector would.

I got very interested in the old 40th Parallel Survey, which was written back in the 1860s, a remarkable document. They covered the whole strip along the railroad, before the railroad was built. The idea was to survey the route of the transcontinental railway, and they did topographic and geological mapping, and they covered an enormous amount of territory. It was all on foot and horseback. They mapped the geology and made a lot of interesting observations which had some economic potential.

I followed up on some of their observations and ran down some deposits that they indicated, which was kind of interesting. They described things in a general way, and then I went in to try to find the exact spot that they talked about, which was sometimes hard to do.

But I found some interesting things. None of them really developed into commercial deposits, but it was kind of interesting to be able to take this report that covered several

hundred miles and to actually find an exact spot in a certain canyon that they talked about--[laughs] that was kind of interesting.

Swent: Where did you get this report?

Livermore: Well, it's available. It's a public document. It's a great, big, very thick volume. And of course, that was just one. There were a lot of other reports, there were the State of Nevada and California and the U.S. Geological Survey--there are all kinds of reports--and then the University of Nevada has old records of private mining reports from mining engineers. So there's all kinds of information.

I had access to some old reports. Of course, at that time I was looking not for gold necessarily. I was looking for any mineral that might be profitable. I was looking for barite, which was popular at that time, and another mineral called perlite. In fact, one of the deposits I found from the 40th Parallel Survey was a perlite deposit which I thought might be of interest, and it was. We staked claims, but we couldn't ever capitalize on that deposit. It wasn't quite good enough quality.

So we were looking for a lot of different things--

Swent: Who is "we"?

Livermore: Well, I was pretty much on my own, but I also worked with an old-timer out there, and he had a vehicle--we used to go out together prospecting. But I was mainly on my own.

Swent: What was his name?

Livermore: [laughs] Gosh, I'd have to dig that up. I'm very bad at remembering names.

Then, I would mix that in with a little consulting work to try to pay the beans, and keep myself going. So I'd do a little consulting work for various people, and then I'd go out prospecting again.

Swent: This gave you an appreciation of what prospectors go through.

Livermore: Yes. Well, if I could have gotten somebody to pay me a salary to prospect, I would have probably just kept on doing that. Of course, gold mining at that time was in the doldrums.

Swent: How do you go about peddling a prospect if you find one?

Livermore: Well, you talk to the mining companies, and try to get them interested.

Swent: So you have to go and hunt them up.

Livermore: Yes. I had some kind of rewarding things. But none of them really developed into much.

Swent: So this was in the early fifties?

Livermore: Yes, that was '50, '51, and '52.

Swent: You said you were down in Death Valley--

Livermore: Yes, I went down to Death Valley, near Death Valley Junction, and I was mining a little bentonite property for a while.

So that was a kind of interesting job. But that was just--they were mostly all short-term jobs.

## V GEOLOGIST FOR NEWMONT MINING CORPORATION, 1952 TO 1960

Livermore: After about three years of that, I finally said, well, I guess I'll have to go to work for a company. I had a couple of offers, but none of them seemed quite attractive. So I decided I'd try to pick the company that I thought had the best reputation for imaginative exploration, and that spent a lot of money on exploration. After reviewing the companies, I really decided on Newmont because Fred Searls, the chairman, was a geologist, and I had heard a lot about him. He had taken on some high-risk exploration, geological bets that no one else would tackle, which kind of appealed to me. So I thought, well, that sounds like a company that I'd like to work for.

It wasn't a big company at that time; I didn't like the idea of working for one of these bigger companies like Kennecott.

I went down to Jerome, Arizona, where Newmont had a geophysical program going on. I applied for a job in exploration.

### The Resurrection Mine, Leadville, Colorado; Underground Mapping

Swent: Who hired you?

Livermore: The first person I talked to was Arthur Brant, who was actually a geophysicist. They had quite a program going on in Jerome at that time; they had a big geophysical research setup down there. And of course, he headed up a very remarkable program in geophysics. But at the time, they didn't have any opening for a geologist there, but he said there was an opening at the Resurrection Mine, in Leadville, Colorado.

Then I later talked to a Dr. G.W.H. Norman, who was the chief geologist, and I was to report to him. He was a Canadian, and a very remarkable man.

I learned detailed underground mapping under Dr. Norman's supervision. Hal Norman had spent many years with the Canadian Geological Survey mapping the old highly distorted Precambrian metamorphic rocks which are very hard to unravel. Newmont had a copper project in the same type of rocks near Jerome, Arizona. The U.S. Geological Survey had thrown up their hands trying to map these complex rocks; they just showed them as a solid color on their maps. Fred Searls was put in touch with Norman and asked him to see what he could do with these rocks. Sure enough, Hal, by very careful painstaking work was able to map out several rock types and work out the structure of these highly folded and metamorphosed rocks. This became very important in our planning an exploration program.

So I went to Leadville as a geologist, and later I became the chief engineer and geologist, doing a lot of underground mapping, and in charge of surveying and stuff like that.

Swent: This was mine geology now, as opposed to exploration?

Livermore: Yes, this was underground work, as the Resurrection was entirely an underground mine. Dr. Norman was a very remarkable geologist, and I learned a lot from him, how to map underground, detailed stratigraphy. He was interested in that.

Swent: What were the mechanics of making a map underground? What did you have to work with?

Livermore: Well, we had the basic surveys, of course, because all of the underground workings had to be surveyed with a transit.

Swent: Did you do that?

Livermore: I did some of that, but only initially. Then later, I had surveyors working for me. We had a regular survey crew.

Swent: These were areas that had not been mapped?

Livermore: Well, that's one of the things that we were doing. We were opening up old workings that had been surveyed but never geologically mapped.

The work was interesting, because we were continually opening up old drifts. We'd break into these old workings, and

then I'd go in and map the geology. We were looking for more ore.

Swent: They had been previously mined, but not mapped?

Livermore: Not geologically mapped. So we would add that to our geological picture, and try to pick out targets to develop, because we were always short of ore there.

Swent: What did you use? Paper, pencil, pens--?

Livermore: Well, we used a hard pencil. And of course, when you're mapping underground, it's always wet, and those old workings are covered with mud. It was the messiest job you can imagine. All the area had been flooded with water, so after a while you were just covered with mud. The only way you could map it was to keep breaking the rock to get a fresh surface, so you'd hit the rock and the mud would splatter in your face. [laughter] It also had a certain amount of acidity to it, so your eyes would sting. But I enjoyed it, because it's part of geology; you're building up a picture, putting it all together, and coming up with targets.

And every time we'd break into a new mine, we'd have all these new levels to map.

We had good surveys, but no geology.

And we worked out a very good stratigraphy, and unraveled the geology that nobody really understood before. It helped us a lot in finding ore.

Swent: Resurrection was a very complicated mine, wasn't it?

Livermore: Yes, it was.[1]

This was a lead, zinc, gold, silver mine, and the price of lead and zinc dropped at a certain point, so they shut the mine down. From there I went down to Peru.

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[1]For more on Resurrection, see Robert Eli Kendall, "Mining Borax, Shaft-Freezing in Potash Mines, U.S. Borax, Inc., 1954 to 1988," 1994, and Frank Woods McQuiston, Jr., "Metallurgist for Newmont Mining Corporation and U.S. Atomic Energy Commission, 1934-1982," 1989, Regional Oral History Office, The Bancroft Library, University of California, Berkeley.

Swent: For Newmont?

Livermore: With Newmont, and that was Cuajone.

We had a joint program with Cerro de Pasco, down in southern Peru near the Chilean border. We were drilling out this porphyry copper with several churn drills.

You couldn't ask for a better climate for field work; never got too hot, never got too cold.

Swent: Peru at that time was a nice place too.

Livermore: Oh, yes. It was very stable, under General Odria; he was a dictator, but I think he was a pretty good one. You never heard of too many human rights violations. The currency was very stable; the sol was the most stable monetary unit of all South America at that time. I can't believe the difference between now and then.

Swent: Arequipa is a lovely city.

Livermore: Oh, yes. It is a beautiful place. We used to go over there quite often.

Swent: Were you there early, before Toquepala was developed?

Livermore: No, no. Toquepala was actually way ahead of Cuajone. What happened was that there were three deposits--I don't know whether you ever heard that story, but it's kind of interesting. Cerro de Pasco had originally drilled all three deposits--Cuajone, Quellaveco, and Toquepala. Cerro de Pasco got hold of them way back during the war, and they were terribly isolated at that time. They had to haul drills in with mule trains, but they had big drilling programs.

They were used to mining up in Cerro de Pasco, where they had 4 or 5 percent copper. In their drilling down there, they were getting 1.5 and 2 percent copper over big thicknesses, which was pretty good by Arizona standards, but the Cerro de Pasco people sort of downgraded them. They thought, well, although they were some of the biggest mines in the world, they didn't compare with Cerro de Pasco. So they were not that excited about them.

This is a story that I heard and I think it's more or less true.

They had an option on this property, this Toquepala property. They had drilled out these three wonderful properties. They had a payment coming up, which was--I don't know, some small amount, something like $50,000. At that time, Cerro was sort of the king of Peru. Everything came to them.

The president of Cerro said, "Well, this fellow's asking quite a bit of money. I think we will get him down to $25,000," something like that. So they let the option period expire.

An engineer from ASARCO by the name of Kurzell somehow or other got in touch with the owner of the property, and saw some of the data. He realized right away the enormous potential of this deposit. He made a verbal deal with the owner, and wired ASARCO in New York, asking for something like $75,000 to pick up the option. They took his word for it, sent him the money, and ended up virtually stealing Toquepala from Cerro de Pasco. They lost one of the great copper mines of the whole world because of not wanting to pay $25,000. Of course, that caused a tremendous furor in Cerro de Pasco, and boy, oh, boy, then some heads really fell. In fact, the vice president committed suicide. I don't know whether it was because of that or not.

They changed the whole top management of Cerro de Pasco. That's when Bob Koenig came in. Whether it was all because of that I don't know.

But Cerro de Pasco still held Cuajone, so that's how Newmont got involved, because Cerro was so embarrassed at losing Toquepala, they decided, well, we'll go ahead with Cuajone and maybe we can make something out of that. So then Newmont was invited in as a partner. That's when I was there.

Cerro de Pasco was anxious to develop Cuajone further to counteract the loss of Toquepala. At this time they had drilled a few holes but wanted to determine more accurately the limits of the orebody. Newmont had developed a new electrical geophysical method called induced polarization which was particularly adapted to the detection of large disseminated orebodies such as the Cuajone porphyry copper. Cerro de Pasco thought this method would be useful in quickly defining the potential limits of the Cuajone orebody. They invited Newmont to conduct an induced polarization survey over the area, and in

exchange for this, offered them 25 percent participation in a joint venture.[1]

This involved putting an intermittent electrical current into the ground, using the so-called "pulse method." A charge would be introduced between electrodes and the current shut off abruptly. Any conductive material, such as sulfides, in the ground would provide a condenser effect and would hold the electric charge for a certain period of time. A measurement of the rate of decay of the charge gave an indication of the quantity of conductive material--in this case, sulfides such as pyrite or chalcopyrite. By varying the space between electrodes, penetration observation could be made at great depths, up to as much as a thousand feet.

The survey conducted at Cuajone did in effect delineate the extent of the sulfide body, but most of the material turned out to be pyrite rather than the valuable chalcopyrite mineral which contained the copper. So the survey did not really extend the size of the known copper orebody.

The joint venture then proceeded to drill out systematically the copper orebody which had already been indicated. I was brought in on this program, which was managed by Cerro de Pasco, as Newmont's representative. We had several geologists and drills; it was a big project. They had quite a nice camp, with a good road.

Later, Cerro sued ASARCO over Toquepala, and they had a tremendous battle; Cerro tried to get it back, but they weren't successful. Then at some point--this was a couple of years later--they finally decided to put all the properties together, and form Southern Peru Copper Company.

So that was an amazing story, how they lost that property. [laughs]

Swent: When you went there, Cuajone was still a Newmont-Cerro joint venture.

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[1]See Simon David Strauss, "Market Analyst for Non-Ferrous Metals and Non-Metallic Minerals, Journalist, Mining Corporation Executive, 1927-1994," 1995; Plato Malozemoff, "A Life in Mining: Siberia to Chairman of Newmont Mining Corporation, 1909-1985," 1990; and Warren E. Fenzi, "Junior Engineer to President, Director of Phelps Dodge, 1937 to 1983," 1996, Regional Oral History Office, The Bancroft Library, University of California, Berkeley.

Livermore: Yes; Toquepala and Quellaveco were ASARCO, and actually, we weren't supposed to be speaking to ASARCO at that time. We earned an interest in Cuajone by doing the geophysical work and other things.

Swent: What were you doing?

Livermore: Actually, Cerro was running the program, and I was the Newmont representative, laying out drill holes and logging, things like that.

Swent: Did you have the ore body defined?

Livermore: No, we were defining it. By the time I was finished there, we had a billion tons of 1 percent copper ore blocked out. No further development was done at that time, and so that was the end of the program.

Swent: How long were you there?

Livermore: I was there about six months. It was a nice camp, a well-organized camp. We had quite a big drilling program; we had four or five drills going, and we had geological mapping and sampling and assaying. It was quite a good-sized camp there.

Swent: What kind of drills?

Livermore: They were using churn drills, American, and all American drillers.

Swent: On contract?

Livermore: I think they were hired by the company, Cerro de Pasco. I think they just purchased the drills. Because it was a long program.

Swent: Newmont had a lab in Connecticut; did they use that?

Livermore: I was just on loan from Newmont; it was [a] Cerro de Pasco [operation]. They had a full-fledged lab right there. There must have been a hundred people or so there.

Swent: When was that?

Livermore: I think that was in 1954. Then I went back to Leadville, I think in 1955.

Iowa Gulch, Colorado, 1955

Livermore: Then I came back to Leadville, because by that time the price of lead and zinc was up again, so we started to crank up the Resurrection again. I enjoyed Leadville, so that was fine.

Then we got going on some exploration work there, and really Dr. Norman was responsible for this, but I was there, and sort of carrying out some of his ideas. We got interested in an area called Iowa Gulch. We drilled into a whole new ore body. That was very exciting to me, because that was really the first discovery I had been involved in. I remember pulling this high-grade core; it was very exciting, in a whole new area.

Swent: And this was lead-zinc?

Livermore: This was lead-zinc, and silver.

So then we did some more drilling, and it was a hard thing to test. The company wasn't making that much money at the time, and we thought we had enough ore for them to justify a shaft and go down and really look at this ore better, and block it out. But the management decided there was too much money involved, and they did more drilling, which we weren't in favor of. We thought we should just take the bull by the horns and go down under the ore and drill up underneath, because it really looked like it could be a commercial ore body.

But they never did follow through on that. And then the price went down again, so the mine was shut down.

ASARCO had the adjoining property. They had an ore body farther north, at the same stratigraphic horizon. Later--this was after I left--Newmont and ASARCO got together, and ASARCO became the operator. They did what we were talking about doing, although instead of sinking a shaft, they came in from the north, under the ore body we had discovered, and drilled it out. It turned out to be a very fine ore body, which they're still mining now.

Swent: How did you happen to find it? Were you following something that you thought was--

Livermore: Yes, just by geology. Dr. Norman was the one that had the clairvoyance--he had the idea of working on fault blocks. This was a new area, and we knew the favorable horizon was present there. It was an untested area, and he was the one that really spotted those first drill holes that encountered the ore.

I enjoyed Leadville; it was a nice town. Pretty high country; we were up there at 10,000 feet. We still were walking around in the snow in April; we'd drive down below and then the trees would be in blossom in the valley. [laughs]

Swent: You were up pretty high in Peru, too, weren't you?

Livermore: That was about 11,000, yes. So I spent quite a few continuous years over 10,000 feet, between Peru and Leadville. In fact, I remember one time I had a blood test, and got the results, and the doctor said, "Gee, my, your red count is really up! What's going on here?" [laughs] Well, just over a period of time, your red count increases because of the lack of oxygen.

Swent: It didn't bother you, though?

Livermore: No, it never did. I never got high altitude sickness, really. I went down one time later, and I did have some problems, but that was because I was not feeling very well. But while I was there, no, I could go up and down, it didn't seem to bother me too much.

Swent: You get used to it.

Livermore: Get used to it, yes.

So anyway, that was the end of that. So then an exploration job came up in Turkey, in 1955. Newmont had quite a program of--

## Exploration in Turkey, 1955 ##

Livermore: Newmont had a deal with the Turkish government, and we mounted really quite an exploration program over there, which I was involved with. We had a couple of teams of geologists, and we did reconnaissance work all over Turkey.

Swent: Did you have to get involved with the government?

Livermore: Yes, pretty much. They had control of everything in the mineral programs as the equivalent of the U.S. Geological Survey; you couldn't do anything without being in partnership with them. We ran our particular program, but when we found anything, we had to offer them a 50 percent interest.

Swent: I would think that Turkey would have been completely geologized by now--their mineral resources have been mined for thousands and thousands of years.

Livermore: Well, no, not at all. Not with modern techniques and modern knowledge. No, it's been walked over. They said that about Nevada. Look at all the discoveries that have been made in Nevada in the last few years. It's been gone over, but they keep finding things in Turkey. They found several deposits there. We were looking particularly for porphyry coppers at that time, because gold wasn't too interesting. So we had a little team there. There was a young geologist--well, I was pretty young myself, but he was a little bit younger. I was mostly in charge.

Swent: What was his name?

Livermore: Jim Hillebrand. We had a young Turkish student who was our interpreter. And we had a cook, and we had our own little outfit--a little jeep and trailer. We just took off all over the country. We were sort of following up various leads we had, that we found in Ankara, asking people. We looked at a lot of different things: chromite--Turkey's a big producer of chromite--but we didn't get too interested in that. We were mainly looking for copper. We looked at a lot of copper showings, and we looked at some tungsten.

We didn't come up with anything, unfortunately. I don't think that porphyry coppers have ever been found even now in Turkey. They have pyritic deposits with some copper. But we traveled all around, up in the north, over on the Black Sea, and out into eastern Turkey, and down along the Mediterranean--it was a fascinating trip.

Swent: Does turquoise come from Turkey?

Livermore: Well, that's a good question. I never thought about that. The name maybe comes from Turkey. Turquoise, yes. That sounds like a French word. I never thought about that.

I went over to relieve a geologist, actually, who had caught hepatitis. While I was over there, he was telling me the story about how he got sick; he was out in the hills like I

was, and wasn't feeling well. Of course, the Turks don't get hepatitis; they're too tough. [laughs]

So anyway, the geologist was way out in a mining camp, army camp. The doctor said he would give him a shot of penicillin. Of course, he had hepatitis, but they didn't recognize it. It's not easy to recognize. He didn't get any better, so he went down to the Turkish hospital, and he was feeling really pretty sick.

I think the first thing they figured, well, he just got some kind of a virus. The next diagnosis was that he had diabetes. So they gave him a shot of insulin in this Turkish hospital, and of course he was smart enough to realize that if they gave him too much insulin, not only was he going to pass out, he was going into insulin shock. He realized that he had to somehow or other get the word that he had to have some sugar. Imagine what a feeling that was; nobody could understand English. He was getting ready to pass out; he might never come to again.

Finally he got the message across somehow or other, they gave him a candy bar or something and he snapped out of it. Then they finally figured out that he had hepatitis, so he had to go home and recover.

Then I ended up getting hepatitis myself, later on this trip. So anyway, we had a great time traveling around Turkey. That was before there were any tourists in Turkey, except for maybe Ankara. We would drive down through the Mediterranean coast; there wasn't a single hotel; there was nothing there. Now it's all built up like Miami Beach, I understand.

We'd drive by these crusader's castles, and nobody would know anything about them, and there weren't any guide books or anything. We'd drive up canyons and there would be Hittite hieroglyphics on the walls, and all these fascinating things, and nobody seemed to know anything about them. So it was really kind of fascinating.

The Turkish people were interesting people. They were very friendly. At that time, we had a very good relationship with the Turks. Well, it still isn't too bad. But we were giving them foreign aid, and they were very, very friendly, particularly out in the country. Everywhere you went, the Turks were very friendly people. Very fine people, the Turks. Particularly the mountain people. You haven't been to Turkey, have you?

Swent: We were there once in 1966, just on a vacation. We went to Izmir and some of the country out there. That's when we had been living in New Mexico; I was surprised how much it was like New Mexico.

Livermore: Yes, well, it is.

Swent: And the people dressed like the Navajos.

Livermore: Yes, that's right. Well, they're interesting people. We were out in the country, in those mountainous areas. I remember in one area, they had this system of whistling; they'd signal; they would talk back and forth across the canyon by whistling. They'd send messages back and forth, and you'd hear them reverberating in the canyons.

The Turks were always very tough and very warlike; hated the Russians, of course. I remember we were out in one town there, and we'd heard that they had caught a Russian spy. The next day, there we saw him hanging up on the main square of the town. They didn't fool around.

Swent: Swift justice.

Livermore: Yes. That was interesting.

Swent: Were you a little nervous about bandits?

Livermore: Well, not really. It's funny, though, we went back to Istanbul and talked with some Turkish people who had never been out of Istanbul and we said we'd been out at Erzërum and places like that. She said, "Oh, my God, you went to those areas? That's loaded with bandits out there!" But we never had any trouble.

Swent: Were you unarmed? Did you carry any arms?

Livermore: No, we didn't carry anything. No, there were some bandits around, I guess, but we didn't carry anything. I think it's like most of these stories; they were there, but no, everywhere we went, the people were very friendly.

Swent: But no copper.

Livermore: No. We really didn't find anything that we could really zero in on, so they just terminated that program.

## Iran and Hepatitis

Livermore: Then, that program was finished, so I went over to Iran. I was going to continue on over there, and that's when the hepatitis hit me. In fact, I got it in Turkey, I think, but there was an incubation period, so I was traveling on to Iran and I got to feeling very weak. I knew something was wrong. Luckily, when I was in Iran, there was a U.S. Army hospital there. I was very fortunate. I didn't have the trouble this other fellow did, so they put me in the army hospital, and I stayed there for about a month. It's a funny kind of disease, because you just feel weak. I never felt too sick, but anyway, I just stayed there in the hospital and then came back to the States.

Swent: Did you get over it?

Livermore: Took me about six months to get over it. I just felt weak for a long time.

Swent: But you have to be careful that it doesn't come back, don't you?

Livermore: Well, I guess so. I haven't been really taking any medication. Sometimes I think that my liver acts up a little bit. And I've had tests, you know, the liver function test which seemed to be all right. Of course, your liver is pretty good at reconstituting itself. But there's always a chance of scar tissue. I guess if it comes back again a second time, it's pretty bad. Sometimes I have a feeling of some sort of symptoms, but nothing that anybody would ever worry about.

Swent: What about your employer's responsibility at that point? What does your company do?

Livermore: Well, that was unfortunate. The worst of it was because I went over there to relieve a fellow who had hepatitis, so I should have been forewarned. What they should have done was to tell me to have gamma globulin, but they never mentioned that to me. We were traveling around just living off the land, eating in local restaurants; I could have gotten it anywhere.

But I did have a shot over there, because I had one more shot to go on my typhoid. I had a shot in Turkey, and that may have caused it. I may have gotten it with my shot. Looking back on it, I never should have done that. But there wasn't that much known about it, although as I say, I should have known. But no, they didn't tell me much about any precaution to take.

But it's funny, the Americans and Canadians are susceptible to it. The Turks never get it.

Swent: They're immune to it.

Livermore: And they're tough. And of course, the other thing you get over there is amoebic dysentery, which is very bad. I didn't get that. I had a lot of digestion problems, but not amoebic dysentery.

Swent: Newmont paid for your hospital care and all of that?

Livermore: Oh, yes. So anyway, I came back home, and I was pretty weak; I couldn't really do field work. So they decided on stationing me in New York. I went back to work fairly soon, which might have been a mistake, actually. I don't know. Anyway, I didn't feel that bad, so I think I took off a few weeks. I got to San Francisco, and got a lot more tests and sat at home. There's nothing you can do about it, really. They talk about a low fat diet, and no alcohol and things like that. I haven't really observed any particular precaution, but I've never been much of a drinker anyway, so that was no problem.

## Working Out Of the New York Office, 1956-1957

Livermore: Anyway, I went back to work in the Newmont office in New York. I would go off, and as I got feeling better, I would take trips, examination trips, out to New Mexico.

Swent: This was your first time to be really in the New York City office for very long, so that was quite a change.

Livermore: Yes. Well, it was, yes. And I enjoyed it, because I enjoyed all the things that New York has to offer.

Swent: Was Fred Searls still there?

Livermore: He was still there, oh, yes. But unfortunately, that was in the start of his decline, which was very sad, of course. I don't know whether he had Alzheimer's or what it was, but his mental facilities went, so that was too bad. In fact, it was sort of sad, because he came down to the office for a while, and he couldn't remember. He was such a remarkable man, and I remember his memory--he had the most amazing memory. By that time, of course, Plato Malozemoff had taken over as president. But Fred Searls was still in the office.

Swent: Please tell me more about him as you remember him.

Livermore: Fred Searls was a real workaholic. They would tell the story of how as a young geologist he would operate as a consultant for several mines. He would often arrive by train at a mine in the evening, spend several hours underground mapping the work performed since his last visit, prepare a report which he would put on the manager's desk, and catch the train out to his next destination. Later on as president of Newmont he would work all week in New York and spend the weekends visiting the mines. I was at a lead-zinc mine in Leadville, Colorado, and was working a six-day week at that time, but Fred would invariably show up on Sunday so we would have to be present to show him around. But we didn't complain; in those days the job always came first--the family took second place.

Swent: How would you describe his personality?

Livermore: Fred Searls was an amateur boxer and liked managers who were tough and could stand up to the unions. If he heard that one of his managers got in a fight in a bar, his standing would increase in Fred Searls' estimation. He was innovative in testing geologic theories to find ore deposits.

## Ambrosia Lake Uranium District, New Mexico

Livermore: It was an interesting experience there. I would take off on trips and examine properties. I went down to New Mexico during the uranium boom there. I tried to get Newmont interested in uranium at that time, but I couldn't talk them into it. But actually, I should have followed up on that. I was in Grants--I was down there when Homestake first started work. In fact, I remember seeing Dick Stoehr there, and he was running the operation. We talked quite a few times. Did you ever go down there when we were there, working there?[1]

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[1]See Langan W. Swent, "Working for Safety and Health in Underground Mines; San Luis and Homestake Mining Companies, 1946-1988," 1995, and Richard Stoehr, interview in process, 1998, in the McLaughlin Mine/Knoxville District oral history project, Regional Oral History Office, The Bancroft Library, University of California, Berkeley.

Swent: I went down in 1957.

Livermore: Were you there when they had all that problem with the water?

Swent: Oh, yes.

Livermore: I remember going underground, just visiting there, and I think Dick showed me around. They had hardly gotten started; they were just driving the development drifts. I remember going out to the face there; they just blasted a round, and then--it was just like Cream of Wheat. It just oozed down over the drift there, and it was terrible stuff. They were having real problems.

It always seemed to me that one solution was to add more water and just pump the stuff up to the surface. I think maybe they did try that. But anyway, of course, as you know, they finally got it dried out. But it was just the most horrible mess, that stuff, to handle. I've never seen anything like that.

I tried to get Newmont interested in some other properties there in Grants. I remember being down there during the day of the Sputnik.

Swent: October 1957, I think, was the Sputnik. And at the same time that the mine was having all its problems with the water, the town didn't have any water, because their water facilities had been overloaded by all the people. We didn't have water. [laughs] It was exciting; it was really exciting.

Livermore: Yes. I was there I guess about two or three weeks. Some of those surrounding properties looked kind of interesting to me but I couldn't get Newmont interested. Plato Malozemoff always said later that he should have followed my recommendation. I don't know, maybe in the long run, it worked out better.

Anyway, I took a lot of other trips. I remember I went down to Venezuela and looked at some stuff there. It was very interesting, because I'd get kind of tired of New York every once in a while; I'd go off on a nice trip, get out in the hills, and then I'd come back and enjoy the city for a while, and then I'd take off again.

Swent: The best of both worlds. What were you looking for in Venezuela?

Livermore: There was a copper property down there that I was looking at, and also a laterite nickel deposit.

Then I went to Chile, and spent some time there looking for things. I had a lot of interesting trips.

Swent: Newmont did something in Chile, didn't they?

Livermore: Not at that time. No, we looked at a few things there. Fred Searls was friendly with Walter Hochschild. Actually, we should have acted on that, too, but I don't know whether we ever had a real opportunity. But a couple of the Hochschild properties that we looked at have since turned into wonderful mines. But whether Newmont could have gotten into that, I don't know. But that was an interesting period.

## Exploration Philosophy

Swent: When a geologist goes out and finds something great, of course, he gets a lot of glory. When you don't find things, does a negative image sort of rub off on you?

Livermore: Well, of course, you have to be an optimist to be a geologist. And if you don't find what you're looking for in some place, you always think, well, the next time it will be the one. But plenty of geologists, very good geologists, spend practically their whole careers without coming up with a prospect which developed into a mine. There's an awful lot of luck in it.

Swent: But people at the home office look on you as the person who's responsible for its being there or not? Did you sometimes feel that as the messenger of bad news, that you were blamed?

Livermore: Well, I don't think we get blamed for it exactly. I don't know. Because I think they do get discouraged. And that's the trouble with most companies; they don't have staying power. They have a big ambitious program for two or three years, and then they get discouraged, and of course, that is hard on the exploration people because they've been working hard at it and just haven't been in the right place at the right time, and then they cancel the whole program. So you do get under pressure, as time goes on, if you don't come up with something.

We found that in Nevada because we were really pretty successful, but we had a long dry spell there, and you wonder if you're ever going to find anything more. It is difficult for a geologist.

Swent: Especially when the people at the top are not geologists.

Livermore: That's right. Well, that was the advantage of Newmont, with Fred Searls being there. That was interesting, when Plato came along, because he was not a geologist. He was a metallurgist, as you know. So he was supportive, but he wasn't that keen on exploration. In fact, I remember one time that he stated outright--this was back in the fifties--he said, "We haven't come up with much ourselves on exploration the last ten years. I think we're better off just to buy mines."

Well, it was kind of interesting, because right after that we found the Carlin ore body, so he had to sort of [laughing] eat a little crow on that one. [laughs]

So I think he decided that there was some merit in doing exploration, and sometimes you can come up with an overlooked ore body. But I remember him saying that. And he admitted that himself, that he'd been wrong. But that's true of the history of a lot of companies: they do exploring, and then they get discouraged, and they think, we'll just buy mines. And then they find that buying mines isn't too satisfactory, so then they say, "Well, I guess we'll go out and explore again." So they go back and forth. And what it takes, of course, is steady plugging. You've got a good organization, you keep going, and you eventually come up with your share of ore bodies.

But during all that period, I didn't come up with very much. I looked at a lot of stuff. So that went on for a couple of years. Of course, I kept feeling better, and after about six months, I was spending more time in the field.

Swent: What was the significance of Sputnik? I was wondering why you had mentioned that.

Livermore: Well, it was just a date. It's like Kennedy's assassination. Everybody remembers where he was at Kennedy's assassination or Pearl Harbor or the Sputnik; they were pretty important events. Ties it down. That was the only reason.

## Chilean Exploration

Swent: What were the properties in Chile that you looked at?

Livermore: We were looking at copper properties. We looked at some iron properties; mostly copper, though. We looked at some stuff at Antofagasta and then central Chile. Nothing really we could

get a handle on. They were mostly properties that were offered to us; for one reason or another, they didn't seem too attractive. There was one property that I was kind of intrigued with, but for various reasons they decided not to acquire it. But it's still an interesting property; in fact, I think one of the major companies started mining it. It might eventually make a mine.

Swent: Does it have a name?

Livermore: It's called Andacollo. Around the margin of the copper they found some gold there recently; that makes it a little more attractive. I think Noranda has been talking about putting it into production.

And I remember a property called Mantos Blancos, which was a small mine then, one of the Hochschild properties, and that's developed into a tremendous mine. That was down near Antofagasta.

Hochschild was a very interesting fellow, quite a remarkable man that was involved in mining in South America, Bolivia and Chile. He was a good friend of Fred Searls. There's the Hochschild that's in Amax, but I think they were a different family. I'm not sure about that.

## Zellidja, Morocco, and Algeria, 1958 to 1960

Livermore: Then this Moroccan job came up, so I headed for Morocco. That was kind of an interesting story. There was a French architect whose name was Jacques Walter who was building a hospital or something like that in Morocco. He didn't know anything about mining. But he got looking around in eastern Morocco, and somehow or other he got onto this lead property, which is way over in eastern Morocco close to the Algerian border, near a place called Oujda.

He was an interesting fellow who happened to be friendly with the daughter of the founder of Newmont, who was Peggy Biddle, who lived in Paris. So through his (I guess) social contact with Peggy Biddle, he was talking about this mine. By that time, I think he'd done a little bit of work on it, and it looked rather interesting.

So I guess she mentioned the Newmont connection, and he thought he needed some technical help, because he didn't know

anything about mining. So he got hold of Fred Searls, and Fred got kind of intrigued with this thing. They brought St. Joe [St. Joseph Lead Company] into the picture at a certain point to give them some help in drilling out this ore body, which turned out to be quite an impressive ore body.

Swent: This was Zellidja?

Livermore: Zellidja, yes. They helped them and then Frank McQuiston was sent over.[1]

He helped them to design the mill. They proved up this very large, important ore body; it was a Mississippi Valley type, similar to southeast Missouri. That's why St. Joe was brought in, because the ore was similar to the type of ore in St. Joe's mine. And St. Joe laid out the mining plan. It was a very efficient plant: modern mill, and very efficient underground mining equipment.

This guy was so lucky. It came along right at the time of the Korean War. So he got financing from the U.S. government to provide concentrates. He got the whole thing financed by the U.S. government. Newmont and St. Joe did all the technical work. He ended up with 95 percent of one of the larger mines in the world. He just made enormous amounts of money on that. Somebody said he was making a million dollars a month on that mine, just unbelievable.

And he was a sharp trader, because of course Newmont and St. Joe thought, "Well gosh, with all this technical help, he'll certainly give us a chance to buy into this pot of gold." No part of that. I think they got each 2 percent or something like that for all this work. [laughs] He was a hard bargainer.

But they did find an extension of the ore body, right on the border between Morocco and Algeria.

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Swent: So they formed another company to go into Algeria?

Livermore: To work in Algeria, and Newmont and St. Joe did get a little bit bigger piece of that. But that never amounted to the same as the original company.

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[1]See McQuiston, op. cit.

But anyway, the mine went along for a number of years, and it was quite profitable. As I say, Newmont has continued to give technical help.

Swent: What were you doing?

Livermore: I wasn't there at that time. But then at a certain point, they started running out of ore, the original ore body. That's when I got into the picture, because they were looking for someone to head up an exploration program. The French geologists at that time--although they were very smart, they hadn't had that much practical exploration experience. They had geologists at the mine, but they didn't think any of them were really capable of directing this program. They couldn't seem to find anybody in France, so I guess they called again to Newmont for some help on this.

Plato Malozemoff suggested my name. So I was sent over there to head up this program. I couldn't speak any French. I did know a little Spanish, but that didn't seem to be a problem, so I took on the project. So I went over there.

Swent: Were you just on loan from Newmont?

Livermore: Yes. And it was kind of a difficult assignment, because I really didn't have the complete authority. The French geologists sort of resented me coming in, although we got along all right. So I was there kind of more as an advisor, although I was supposed to be the nominal head of exploration. They did mostly what I recommended, but a lot of things they did I didn't particularly agree with.

Swent: What sorts of things?

Livermore: Well, [laughs] we had a funny case with one geologist over there. They were very academic, the French technical people. We had one geologist on the Algerian side, and he was a very smart fellow. He wouldn't go underground; he wouldn't map the stopes. I spent a lot of time underground; I did a lot of work mapping the stratigraphy, because they didn't believe in this. I enjoyed that mapping. It was pretty obvious--you could see underground the roof was very bad; the stuff was collapsing and they were getting terrible dilution. You could just see this waste rock coming in there.

I told the manager. I said, "You've got a real problem here with dilution of this mine. I think your geologist is not spending enough time underground."

So we talked it over with the geologist. He said, "I don't think it's important to go underground. I have all the knowledge; I know about this mine." The French are sort of intellectual. So he said, "Well, I guess it's an intellectual difference of opinion. You think I should map underground. I don't think there's any point in it."

Of course, you never know when you're mapping geology whether you're going to get anything out of it or not. Sometimes you do and sometimes you don't. But it's worth a try.

So I told the manager, "My recommendation is that this mine should be mapped, because I think it will become evident that you're getting a lot of dilution in the mine." I even had taken samples to prove it.

"Well," he said, "we don't have enough evidence here." They're very mathematical.

So anyway, I said, "Well, that's my recommendation."

I went back to the general manager and told him, and he said, "Well, you know, he was in the office every day, he was putting in his eight hours a day." He was doing a lot of mathematical calculations. He was very good at that. So I guess the manager said, "I guess the solution to the problem is to fire this guy."

But it was really interesting, because in France, and most European countries, a professional has a much higher status than in America. To fire him--they had a very difficult time firing him. He said, "Well, here I am doing my job, I am down here eight hours a day, and I'm preparing all the reports you're asking me to do, I'm keeping all the records perfectly." Which he was doing. He said, "Your firing me, that's going to ruin my professional career. I resist being fired."

Well, after negotiating for about a month or something like that, they finally--he did agree to resign. They paid him some enormous bonus and things like that. But it was a very interesting thing, because in this country, it would have been very simple.

So anyway, they did get a guy down there mapping, and they did prove what I could have proven with my own two eyes--and he collected all kinds of samples and did mathematical studies--and yes, he said, "You're right. We are getting dilution." [laughter] That was very funny, because they look

at it intellectually so differently. They had to have the numbers, you see. They just couldn't go down and look at it. That was too simple. But they mapped, and it helped them a lot in their stoping. That was kind of an example of it.

But they're interesting people. I enjoyed in some ways working with them; they were very intelligent. Wonderful educations. Every geologist has to have a complete engineering training before they even start on geology. So they're all what they call ingeneurs geologues--engineer geologists--and they're very much into mathematics and statistical stuff like that.

I guess I accomplished something over there. We did find a fair amount of ore. It wasn't highly successful, actually, the exploration, and we didn't find any large new ore body, unfortunately.

I was the only one speaking English over there, so I had to learn to speak French. So it was interesting from that point.

Swent: That would be a plus.

Livermore: Yes. And it was a nice country, a nice climate--beautiful climate there; it was up in the foothills of the Atlas mountains, and it was a nice temperature. It was a pleasant couple of years there.

Swent: Was it a good time politically to be there?

Livermore: Well, that was another interesting thing. Morocco had already gained its independence from France. The problem was on the Algerian side, because Algeria was in the process of getting independence, and they were constantly rebelling. We were right exactly on the border. What would happen was they would train these *fellaghas*, these rebels, they'd train them on the Moroccan side, and then they would try to sneak across into Algeria to join their fellow rebels over there.

They had big barbed-wire fences all along the border, and it was quiet during the daytime, but the war would start at night. We could hear them. There was a French post right above us. At night, you could hear--the French would be machine-gunning these people trying to get across the border.

In fact, we had one drill crew drilling up pretty close to the border, and they started shooting at them. But they weren't hurt, luckily. So that was kind of interesting. Then

every so often they would lob a shell that came a little close to the camp there. So it was kind of an exciting period.

It was perfectly quiet in the daytime. We would go over in Algeria, and it was okay in the daytime. But you had to be very careful to get out before the night. When we were there, there were two Americans that were driving in Algeria, and they stayed too long, and they didn't get into where they were going by nightfall, and they were held up and shot. So it was kind of tricky.

Swent: You stayed in Morocco, and just went over to Algeria--

Livermore: Yes. We went down to Algiers, took a few trips around. Nice country. I enjoyed Morocco. Morocco is a beautiful country; it's like California. Nice climate.

Swent: How long were you there altogether?

Livermore: About two years. Quite a while.

[Interview 2: June 7, 1992] ##

Swent: You wanted to mention a little more about the Moroccan period?

Livermore: An interesting sideline of my tour of duty in Morocco was the story of Jean Walter, who was the owner of this mine. His wife was a great beauty in Paris, and she had a very colorful history; two of her husbands had died under very strange circumstances. There was a big scandal in Paris, which was in the newspapers for weeks, called "L'Affaire Lacaze," because her maiden name was Lacaze.

Once she and Jean Walter--her husband--were at a restaurant outside Paris, and he stepped outside of the restaurant and supposedly was run over by a car. It was kind of a mysterious circumstance. One of her other husbands died of some mysterious ailment, and there was some question of whether he had been poisoned.

Another incident was when she had a stepson whom she wanted to disinherit. The investigation never really proved it in court, but there were endless investigations in Paris and various subplots: she supposedly hired an Algerian paratrooper to murder her stepson, and her brother, Jean Lacaze, supposedly met with some Parisian prostitutes and money was exchanged--and this thing went on for just literally weeks in Paris. Big investigations, but nothing really came out of it. She never

was indicted. But it was quite a fascinating story. This was all going on while we were over at the mine there in Morocco.

My tour of duty was pretty well finished then. I went over with the understanding that I would stay for about two years, I think, and I really was ready to come back and get onto something else.

## Eureka, Nevada; Adapting Oilfield Drilling Techniques

Swent: So you went back to the New York office then?

Livermore: No, then I was assigned to a project to Eureka, Nevada. We had a joint venture with two other companies, Cyprus and Hecla. This was an old mine which had been mined in the early days, the Ruby Hill Mine, and a Canadian had discovered an extension of the old ore bodies at considerable depth. This joint venture was put together to drill out this new faulted extension of the ore body.

I was assigned to run the drilling program there, to test for these deep extensions. It was an interesting project, because this ore zone was quite deep. It was down 1,500 to 2,000 feet below the surface.

Some of the early drilling had shown the conditions were very difficult for normal drilling techniques and the cost was very high.

Swent: What were you mining?

Livermore: This was a lead-zinc-silver deposit. I had the idea that oilfield type of rigs might be the way to drill, try to get holes down at a more reasonable cost. This had never been really tried in this type of mining application. I traveled around to several of the oilfield drilling areas, and looked at some of their techniques.

Particularly they had a technique of using compressed air instead of mud to bring the cuttings up from the drill hole. I thought that would have applications, because we were drilling down through rock that had a lot of cavities in it.

Swent: How did this differ from ordinary mining drilling?

Livermore: Well, the way it had been drilled before, you circulate water and mud. But because this rock had a lot of cavities in it, you would circulate water and mud down, and it would disappear in the formation. It wouldn't come back up to the surface. Which made it difficult, but mainly, you didn't get any cuttings coming up to the surface, so you didn't know what you were drilling. Of course, to sample the rock, we had to get something to show what we were drilling. The advantage of the air drilling is that you could go down through these areas with large cavities, and you could get the cuttings to circulate back up to the surface.

Swent: You said that this was an extension of the ore body, but you were drilling from the surface?

Livermore: From the surface, yes. So we brought a big oilfield rig in there, using this air method, and it did work pretty well, but not quite as well as we had anticipated.

We ran into some other problems which we hadn't anticipated. We got the cuttings back, but we found the walls of the holes were caving very badly, and we had to set casing, and it got pretty expensive. But we did get the results we wanted, and we did block out this ore body.

It was below the water table, and it looked like it might be very difficult to actually mine this ore body below the water table. But anyway, that project was terminated, because we had completed the drilling project.

Later on, after I left, they did make an attempt to go down with some underground workings and actually expose this ore underground, under the water table, which was another very complicated engineering job. But I wasn't involved in that.

Swent: When you did this drilling, were you then supposed to give a recommendation as to whether they should continue with it or not?

Livermore: Well, yes, and I came up with some reserves, calculated reserves on the basis of this drilling, which looked pretty interesting. Under normal conditions, it would have been a very valuable ore body. The problem was, as I say, it was below this water table, and because the formation was so open, with interconnected channels, to drain the area, which you'd have to do for mining, looked like a very difficult job.

So my recommendation was that they should proceed, and see if they could actually go down and drain this area. Which

they did attempt to do later, but I wasn't involved at that part of it.

That attempt was successful in getting down and looking at the ore body, but the cost appeared to be so great that that was abandoned, too. And actually, that ore body is still sitting there. Someday maybe somebody will mine it.

Swent: Does the same group still have it?

Livermore: Well, no. It was turned back to the original owners, which was a subsidiary of U.S. Smelting and Refining at that time. They have their separate company called Ruby Hill Mines, I think. So it's still sitting there. [laughs]

Swent: Well, someday maybe it will be opened again.

Livermore: Yes.

Swent: Let's expand just a little bit at this point about your role in this. You were asked to go and block out the ore body. And then you have to--you get all these cuttings, and you look at them. You send them to an assayer, to somebody to analyze--

Livermore: Well, we had an assay office right there; we did our own assaying right there.

Swent: And then you sit down in your office with those results, and you have mining costs?

Livermore: No, no. I didn't get into the engineering aspects of it. I just calculated I thought there were so many million tons of a certain grade down there. We did some metallurgical testing, so we knew some of the metallurgical properties, but that's as far as I got, because the problems of actually mining it, we knew those were very severe. But I didn't get into that part of it. That was done later.

Actually, Hecla came along later, and they became the operator, and they did a very expensive job of sealing off water in the shaft with cement grout so they could go down and look at the ore body. But they finally decided it wasn't economic at that time.

Swent: How was your report submitted? Did you send in a written report, or did you go before somebody with a chance to be questioned and defend your ideas?

Livermore: Well, we had a meeting of the joint venture partners, and at that time, Cyprus was the managing partner of the joint venture. I was reporting to a man named Bob Hendricks, with Cyprus. But then when that work was finished, then they all got their heads together and decided not to do anything right immediately. And then it was later they came along, I think it was at least a year, or maybe it was two years later, Hecla decided to carry on. They decided that they wanted to take over--they became the operator, and they did all this underground work.

Swent: Do you get sort of emotionally involved with this? Do you feel that it's your baby, that you want to promote? Is it hard to be dispassionate about it?

Livermore: Well, it wasn't as if it was a new discovery. Actually, the displaced ore body was found--that was an interesting story--it was found by a very famous Canadian mining entrepreneur named Thayer Lindsley.

He happened to be in Nevada getting a divorce--you had to wait six weeks to get a divorce, and he wasn't about to waste his time. He got studying geological maps and studied some information on the Ruby Hill Mine, and he read the old reports that said that this ore body had been faulted off, and that there might be the down-dip extension still existing. So he went in there and he drilled some holes, and he actually found it. But he had these tremendous drilling problems, using the conventional drilling method, and he had to give up on it.

And that's when we went in. We thought with this new technique that we could--with air drilling and using these big rigs. So it really wasn't the fact of discovering it. All we simply did was try to block out what he had actually found.

Swent: So you didn't feel--

Livermore: --that it was a real discovery--no.

Swent: Who made the drills that you used?

Livermore: The type of drills, you mean?

Swent: Yes.

Livermore: I don't even remember that. But one of the things we had that was very impressive, we had these enormous compressors, because we were drilling down under several hundred feet of water, and in order to lift this water and the cuttings out, we had three

enormous compressors and we were operating at a thousand pounds pressure there to remove these cuttings. This is something, as I say, it hadn't ever been done in mining exploration before. We were using oilfield type of equipment. We drilled one hole I think over three thousand feet deep, which for rotary drilling for mining was quite deep.

So it was an interesting project from the drilling point of view. It was a fascinating job. [laughs] And of course, the drills were going twenty-four hours a day, and I can remember that it seems like we'd always have our problems about 2:00 a.m. The driller would come in and tell me that we were having problems with the drills, so I just practically couldn't leave the project for about three or four months; I was there seven days a week, twenty-four hours a day practically.

Swent: How far out of town was it?

Livermore: Well, we were right in Eureka, which is a little town in the central part of Nevada.

Swent: There's a lot of mining around there, though, isn't there?

Livermore: Well, there wasn't much at that time. There had been. No, it was pretty quiet at that time. There was only maybe a thousand people living in the town. It was a pretty small town, actually.

Swent: You didn't try core drilling?

Livermore: Well, we had done core drilling before, but the reason for doing the rotary drilling, we thought we could do it quite a bit cheaper. The core drilling is very expensive. That had been tried before, but we thought that with the rotary drilling, we could do a lot more drilling, and drill a lot more holes for the same price. It only partially worked out the way we thought it would, because we were able to drill down through these open cavities, but we had other problems of caving ground and--it turned out to be more expensive than I had anticipated, but still it was cheaper than core drilling.

Swent: Did you hire the contractors?

Livermore: Yes, I arranged for them all. Yes, I did all that.

Swent: Did you have favorite drillers that followed you around from place to place?

Livermore: No, no--we just hired a contractor, and they provided the drillers. No, I didn't have anything to do with hiring the drillers. But I did go out and select the proper contractor, with the right equipment that we wanted.

Swent: Well, this is what I mean, the drilling contractor. You had particular ones that you preferred to deal with?

Livermore: Well, this was something very new. I never had dealt with any of the oilfield type of equipment, so I had to just go around to quite a few drilling projects in the oil country, and not too many of them had this particular type of equipment. I didn't know any of them before, actually. I just had to sort of decide by word of mouth recommendation which one to use.

Swent: Between these assignments, were you going back to New York?

Livermore: No, not really. Not too much. I stayed there. I looked at some properties after the drilling had finished.

Swent: Did Newmont have an office out here in the West?

Livermore: No. I just stayed at the hotel there. No, we didn't have any office at that time.

Swent: Everything done by phone?

Livermore: Everything was done by phone or letters; I was working directly under Fred Searls, who was the chairman of Newmont in New York. He'd come out from time to time. But I was pretty independent, actually. On the drilling, I was working for this Bob Hendricks, but after that was over, I went back under the Newmont supervision, so I was reporting to the chairman of Newmont, Fred Searls.

## VI DISSEMINATED GOLD AND THE CARLIN DISCOVERY, 1961

Livermore: I looked around at some various properties, because I was in that area. I'd always had the idea about this disseminated gold from the time I worked at Standard. I always had the idea that there may be some more of that type of deposit around.

Swent: Standard was the mine that Stu Rawlings had.

Livermore: Yes, Stu Rawlings. But I didn't have any very obvious way to pursue looking for this type of deposit, some kind of a geological theory, for you just can't look everywhere. But about that time, too, I had read an article published by the U.S. Bureau of Mines. I don't know whether you want me to go through this whole thing, because that's pretty much in that Alan Coope report.

Swent: Let's mention it, at least. We can refer to the Alan Coope report.[1]

### O.W. Vanderburg Report, 1939

Livermore: This was 1960, and I was reading a report written back in 1939 by a U.S. Bureau of Mines mining engineer, and he had been looking at several properties in Nevada. He was not a geologist, but he was a good observer, and he reported there was something interesting about certain deposits in Nevada. There were four or five deposits that he had looked at--

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[1]J. Alan Coope, Carlin Trend Exploration History: Discovery of the Carlin Deposit, Nevada Bureau of Mines and Geology Special Publication 13, 1991.

Swent: Is this Roberts?

Livermore: No, no, this was O.W. Vanderburg. It was 1939. He noted that there were several producing mines in Nevada that had certain unusual characteristics, different from a lot of the other standard gold mines. They were in sedimentary rocks as opposed to volcanic rocks, and they were disseminated deposits of fairly large dimensions.

Vanderburg realized that there was the Getchell, there was the Gold Acres, and this Standard Mine where I had worked was in that category. These were unusual deposits in which the gold was very fine. Well, that was a very good observation, and also he said at that time in his report, "I think there are more of these deposits to be found in Nevada." So he was a very far-sighted person.

Swent: What led you to look up this report, and where did you find it?

Livermore: Well, in this business, you're always doing research. That's one of the things in exploration, we're always looking at old reports, and when you get in an area, you look at any reports pertaining to that area.

Swent: Where do you find them?

Livermore: Well, this was in any library. I don't remember where I first saw this; it might have been in the University of Nevada library or someplace. But these reports were very interesting. There was a series of reports put out by the U.S. Bureau of Mines on describing different mines in northern Nevada at that time.

So when I read this report, that really intrigued me, because I had been interested in this type of deposit way back in 1949 and this suggested that some other deposits of this type might exist, which the old-timers could have missed simply because the ore didn't pan. It could be even right on the surface.

## Ralph Roberts of the U.S. Geological Survey

Livermore: So I got kind of interested in that, and then another occurrence happened right at the same time. A U.S. Geological Survey geologist by the name of Ralph Roberts was doing a lot of regional work in the area, and he came up with the theory of

this very major thrust fault in this area; it was called the Roberts Mountain Thrust, not after Ralph Roberts, but after the Roberts Mountain. By very careful mapping, he had concluded that there was this enormous thrust structure where the rocks had been shoved horizontally about fifty miles to the east in the central part of Nevada.

He gave a talk one time in Ely, which I attended, in eastern Nevada, and he expounded some of his ideas, which were followed up by a paper he wrote in 1960, about the same time, where he took some of the known occurrences and plotted them on a map, and found that a series of these occurrences seemed to be close to where this Roberts Mountain Thrust outcrop was. They weren't all gold mines; there were some lead mines, but there were also several gold mines.

I was very intrigued with that, and I actually talked to Roberts quite a bit after this paper he gave in Ely, and pursued the matter further with him. That really got me interested, because now I had a model to follow to try to find some of these deposits. I thought there was a good chance they existed. Maybe the old-timers would have missed them because of this fine gold, but now with his theory, maybe this was a way to look for these deposits. Maybe just by carefully mapping and prospecting this Roberts Mountain Thrust, we could find more of these deposits.

So I suggested that to the Newmont management, that we set up this project, and they went along with that. Since I was in Nevada and finished with the Ruby Hill job, it was logical that I take on this project.

Bob Fulton, who was vice president of exploration for Nevada, had also read Ralph Roberts' 1960 report and was intrigued by it. He had a geologist named Alan Coope who was already working in Nevada at that time on another area, and so we got together with Fred Searls.

Swent: Who was this?

Livermore: Bob Fulton, Fred Searls, and I had a meeting to discuss the idea of following up on Roberts' ideas.

Swent: Where did you meet?

Livermore: In Nevada. And we agreed that there was something that we could follow up on. Since I was in Nevada, I was the logical

one to follow up on this finding, and since Alan Coope was already there, he was assigned to me as an assistant.

Swent: Can you tell a little more about Fulton? What sort of person was he to work with?

Livermore: Well, he was a very unusual man. He was a mining engineer, basically, but he had gotten involved a lot in exploration and was a tremendously active, hard-working person and a great asset to Newmont. He was a workaholic type and on the go all the time. Came up with some very interesting projects for the company.

Swent: Was he older than you?

Livermore: He was about the same age as I was. I was not working under him; I was working under Fred Searls at that time but we worked together very closely, and later of course he took over the Carlin exploration after I left, and really made it into an ore body.

Swent: He was not a geologist?

Livermore: Not a geologist, but he became very knowledgeable in geology, and he had--he was very interested in that aspect of it, and although he was not a field geologist, because he usually worked out of the New York office, he managed a lot of exploration projects and became very familiar with all aspects of exploration.

He was not directly involved in the early work, because I was reporting to Fred Searls at that time. He was following what we were doing, very closely, and after I was transferred to Canada in January 1962, he took over the work and was in charge of the early drilling and the early development, and he was really responsible for developing the Carlin deposit, other than the early prospecting.

Swent: He was not in on the first discovery.

Livermore: No, no.

## Prospecting the Roberts Mountain Thrust

Livermore: There was another young Newmont geologist in Nevada at the time, a fellow named Alan Coope. He was assigned as my assistant. So we simply started out following up on this theory. There was a general map showing where this Roberts Mountain Thrust was, and it extended all the way from central Nevada up into Idaho. So there was a lot of ground to prospect. We simply started north of Eureka, where the thrust occurred, and we carefully mapped it and followed it and sampled it. We began to get some very low values, nothing very exciting. But we began to realize the association of certain features with gold, which is mainly a silicification known as jasperoid. We began to see that these were certain features we should be looking for as we prospected along this fault.

Swent: Were you just sampling with a hammer and little canvas bags?

Livermore: Yes. That's all.

Swent: Nothing high-tech?

Livermore: No, not really. We just sent the samples in, and ran them for gold. We'd run them for other metals, too, sometimes mercury and antimony and arsenic, which often occurred with the gold. But mainly we were just sampling for gold.

So we had been working along, we were getting a few little values, nothing too exciting. Then at one point I was talking to a manager of one of the mines (Gold Acres), named Harry Bishop, who had been around that area for a long time, and I told him what we were doing, and the association with the Roberts Mountain Thrust, and so I asked him, "If you were going to prospect the Roberts Mountain Thrust for gold, where would you look?"

"Well," he said, "there's a new mine just being developed up north of Carlin, which I would suggest you go up and look at."

## The Blue Star Mine

Livermore: I wasn't familiar with this mine at the time. This was a small mine called the Blue Star Mine which was being developed. It

had a small mill there. It was not a very well-run outfit; it was kind of a promotional group from Salt Lake City.

But the interesting thing was that sure enough, here this deposit was right on the Roberts Mountain Thrust, which was exactly what we were looking for. So we got looking in that area, and we found that there actually were two or three old properties in what was called the Lynn Window. It had some known gold, so here were three known properties on the Roberts Mountain Thrust. So we decided, well, this is maybe where we should be zeroing in, on this area. We'll just work very extensively on this area.

So we shifted our activities there to the north. So that's what we did: we just mapped and sampled this area very carefully, and we were getting low values. But we found one hill which is known as the Popovich Hill, and we were starting to get some values over a fair area there. At that time, with the price of gold $35, they were nothing that was even close to being economic.

[Interview 3: August 31, 1992] ##

Swent: Again, who is "we"?

Livermore: Well, that was Alan Coope who was working with me at that time.

Swent: But you were the leader; you made the decisions?

Livermore: Yes, I was in charge. He was a younger geologist, so I was really in charge of the party. He had just come out of school, actually.

So we decided just to systematically map and sample the Carlin Window--I mean the Carlin and particularly the Lynn Window. We covered a lot of ground very, very carefully, mapping and sampling and studying the rocks, and the alteration.

Swent: How much ground would you cover in a day?

Livermore: Oh, that's a good question. We were doing it very, very slowly. We were mapping all the rocks. I suppose we might cover a mile a day or something like that.

Swent: You were staying in Battle Mountain?

Livermore: No, we were living in Carlin, living at a motel in Carlin. We drove out to the area where we were working, and started

walking. We would map the rocks, and then take a lot of samples, and we would send them down to this assay office that was down in the Crescent Valley.

Harry Treweek, Assayer

Swent: How did you select your assayer?

Livermore: Well, he was the only one available in the whole area. At that time, it's hard to believe, there was so little going on, there wasn't even an assay office in Reno at that time. Harry Treweek had a little operation, and his own assay office. He and his wife lived out there all by themselves.

He was a very good assayer. We had confidence in him because these samples we were taking were often very low-grade samples, and we wanted to be sure that what he was reporting were true values, and not just spurious values. Often it's hard to detect small amounts of gold in a sample. You have the danger of contamination and various other things.

Later, various stories came out how we were trying to throw people off the track. One story even was that we only worked at night. That's sort of ridiculous. Because we really didn't have any competition. But anyway, these few legends sort of developed, and that we took the samples way over to Crescent Valley to throw people off the track. Of course, as I say, that was the only assayer around, so that was the reason for it.

Swent: You probably were doing a lot of work at night, weren't you?

Livermore: Well, we wouldn't go out in the field too much at night, no.

Swent: No, but I mean a lot of office work.

Livermore: Well, we worked at night in the office, oh, yes. In drafting up our maps and things like that. Oh, yes, we worked a lot.

Swent: Did you have an office in Carlin?

Livermore: No, we just lived in a motel.

Swent: Did you take your samples over to him at night, just because of the circumstances?

Livermore: Well, we would take them over at night, yes, because that was at the end of the day.

Swent: But not to do it secretly.

Livermore: No. And one thing about it, too, we got the results very quickly, which was very important, because we had to know as we went along, we had to have results to guide our work. And he could do these samples in one day, which was very good. A lot of labs can't do that. He was very cooperative. Luckily, he didn't have too much else to do at that time, because his mine was shut down, so he was just sort of living there with his wife. His wife helped him on preparing the samples, so we got very quick results, so that was good.

Swent: How did you know that they were accurate?

Livermore: Well, we had confidence in him. We would send out check samples to other labs. There was a very good lab in Salt Lake City at that time, and we used to send samples in to them.

Swent: Just to compare.

Livermore: To compare them. We developed confidence in him, and he had already a good reputation anyway. So we really felt that his samples, particularly the low-grade ones, were meaningful. A lot of the values we were getting were really just barely traces of gold. We wanted to make sure those were real values, and not just contamination.

Swent: What sort of values were they?

Livermore: Well, you know, like one or two hundredths of an ounce, that's what we were getting. For fire assay, that's not too easy to detect down to those limits. Now, since then, they have much better ways of detecting gold. You can detect them down to much lower levels, but at that time, that was about the limit.

Swent: And did you have anybody from Newmont that was interested in what you were doing?

Livermore: I was reporting to Fred Searls at that time, and also Bob Fulton was involved. He was in charge of exploration in the United States and other areas, and he was actively involved. They came out from time to time, but not very often. We were pretty independent.

Swent: Did they encourage you?

Livermore: Well, they did, although I think I mentioned that before, that when we finally got interested--well, they were very interested in the project. In fact, Bob Fulton had quite a bit to do with suggesting the project, encouraging the project. So yes, they were interested in it.

But when we finally kind of zeroed in on Popovich Hill as being somewhat interesting, they came out there. We were getting some of these very low values on this Popovich Hill which were in the right geological setting, so they seemed interesting, although if we'd gotten those same values somewhere else we wouldn't have paid much attention to them.

In order to confirm that we were in the right setting--the Roberts Mountain Thrust--we invited Ralph Roberts of the USGS, who was the great expert on the thrust, to visit the property. The purpose was to verify our conclusion that these values were located in or close to the Roberts Mountain Thrust. We also visited a number of other properties--Bootstrap and Blue Star--with similar settings. This opinion by Roberts gave us confidence in our interpretation and increased the significance of the low gold values which we had been obtaining.

So then we invited Searls and Fulton to come out.

## Fred Searls Says to Stake the Claim

Livermore: So I always remember when Fred Searls and Bob Fulton came out, and it was kind of dusk. We showed them what we had, and these very low values, and scattered over a fair area. I said, "I think we should stake claims here. We've got enough encouragement." Fred Searls obviously wasn't too impressed. [laughs] But he said, "Okay, John. If you want to, go ahead and stake the claims."

So we did stake the claims, which of course turned out to be the Carlin ore deposit. But at the time, it wasn't very impressive. [laughs]

Swent: Where did you go to stake them?

Livermore: Well, we just bought posts and staked them right on the spot there. We staked I think sixteen claims there. We had to take them in to the county seat for recording.

Swent: Where is that?

Livermore: That was in Eureka, it was in Eureka County. But as I say, we weren't too worried about competition. There wasn't anybody around.

We did find out later there was one fellow who turned out later to be my partner when I came back ten years later. He was sort of following us around a little bit, Pete Galli. But he told me that afterwards. He kind of knew what we were up to.

Swent: This was 1961?

Livermore: That was 1961, but when I came back to Nevada in 1970, we became partners, actually.

Swent: You didn't know him in '61?

Livermore: Yes, I knew him in '61, yes.

Swent: Just didn't know he was following you.

Livermore: I didn't know he was following us around.

Swent: So you were doing about a mile a day, and you virtually started where you ended up, didn't you?

Livermore: That's right. It was not a big area, and of course, looking at the program as a whole, we were fantastically lucky, because the whole program only literally lasted about three or four months. In a program like this, you might be working on it for a couple of years and end up with nothing. But we got onto this very quickly, and that was--that's part of the game.

Swent: But you were very well informed before you zeroed in on it.

Livermore: Well, yes. I think we thought we knew what we were looking for, and a certain type of deposit. And actually, it turned out that we found exactly the type of deposit we were looking for. The only thing, it turned out to be much bigger and much richer than we'd ever possibly thought we'd find. So it's usually the other way around. You make what's called a technical discovery: you find what you think you're looking for, but it's not commercial. That doesn't pay off, unfortunately. So that was good in that sense. Because this was so much bigger than any of the others, the Gold Acres, the Getchell, and Standard.

Swent: Big in area?

Livermore: Big in tonnage and in grade. The original Carlin reserves were about three million ounces, and I think most of the other deposits were in the order of a few hundred thousand ounces. This was many times bigger than anything that had ever been found before.

## Exposing the Bedrock; Finding the Carlin Ore Body

Swent: Did you have anything to do with delineating the deposit?

Livermore: No. I didn't, because after we staked the claims, then we decided the next step would be to expose the rocks. There weren't very good exposures. Most of our samples were actually chips of rock, which had been broken off the bedrock, lying around the ground. We sampled chips, and we sampled sort of selectively the best-looking chips, because we thought if there was nothing in those better-looking chips, there probably wasn't anything around.

Swent: When you say best-looking, what do you mean?

Livermore: Well, by color, and by alteration.

Swent: What color were you looking for?

Livermore: Well, we were looking for hard rock due to silicification, and iron staining. The two things that are associated with gold are pyrite and silica. So we were looking for silicification. The pyrite breaks down on the surface to iron oxide, so you're looking for a rusty color which indicates that there is pyrite at depth. And certain types of color are quite important. We found that certain kinds of brown, the darker browns tend to be more encouraging than the lighter, sort of the yellowish browns. So there were certain color things that we were looking for.

And the right kind of rocks, of course. You had to be in a certain type of sedimentary rock, certain type of a siltstone, calcareous siltstone, which was the more favorable host rock. Those were the various things we were looking for.

So anyway, we decided that we'd stake the claims. So the next stage was to try to expose the bedrock better, and the best way to do that is with a bulldozer. So we got a bulldozer

in, and we put in several trenches there. We got a lot of low-grade values, but in one trench, we had--let's see--on the edge of a dike, we had some much more interesting values. [pause, looking at figures]

Swent: A dike is volcanic, isn't it?

Livermore: Yes, but that was a dike cutting through the sediments. The rocks are sedimentary, but there were narrow dikes cutting through. On the edge of this dike, we exposed, over a width of eighty feet, material that averaged .20 ounces of gold per ton. Now, that was pretty interesting, because that was getting close to a commercial grade. So we realized there that we really had something. That was the real discovery. We realized that this was something that we had to drill out very systematically, and that was the end of that program. That, of course, turned out to be part of the Carlin ore body, the real Carlin ore body.

But then the winter was setting in, and nothing much could be done until next spring. So I was transferred at that time up to Canada, so I wasn't involved in the later work there. The work was taken over by Bob Fulton.

Swent: Did Newmont ever reward you in any way for this?

Livermore: Not directly, although I did later get opportunity on some stock options which were not necessarily related to Carlin, just as other senior people in the company did. But at the time, I never felt I needed a reward. I was just doing the job that I was paid for.

Since then, they've had a lot more programs of bonuses in corporations, and a lot of companies have bonuses. In the later operations that I managed, we always had discovery bonuses for all our people. But at that time, that wasn't common.

Swent: Did they say "Thank you very much," or write you a nice letter, or anything?

Livermore: Well, I guess they appreciated it. Plato Malozemoff was the president. Newmont had been doing a lot of exploration, and hadn't really come up with very much. So Plato was one of the believers that they really were better off to spend their money acquiring properties, rather than exploring for properties.

Swent: He was not a geologist.

Livermore: That's right. But anyway, after the Carlin discovery, he had to admit that there was some merit in the company doing their own exploration.

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Livermore: A lot of companies swing back and forth. That's part of the history of mining, that companies swing back from exploration, which is of course a very bad policy, because you're much better off to keep a program going with the same personnel, and you have the right people working, and over a period of time you keep finding things. But sometimes you have long dry spells.

But anyway, after that, Newmont beefed up their exploration staff, and did concentrate more on exploration. So that was the end of the Carlin thing as far as I was concerned except that I would hear about the drilling.

Bob Fulton did a very good job of managing that development part of it, and I started hearing about some of the early drill holes. The third hole they drilled was a fantastic hole. It ran--I think it was seventy-five feet that averaged over an ounce, which is just an unbelievable hole.

Swent: Was this in that dike area again?

Livermore: No, it was a little farther away. It wasn't in that same spot. It was over in the other part of the property.

So anyway, I remember I was transferred to Toronto there. I had a call back--I always remember--from Plato Malozemoff, who by that time was president. He said, "John, it looks like we have an ore body in Carlin." So of course, that made me feel pretty good, because they'd done enough drilling to know that they definitely had an ore body there, and it kept getting bigger and bigger until it was--as I say, it ended up, the final reserves were 11 million tons of three-tenths, which by any standard, and even at that old price of $35, was a very good ore body.

Swent: And Plato obviously did give you credit for it.

Livermore: Oh, yes. He did. It was very rewarding. That was the whole purpose of what I was hired for.

So that was the end of the Carlin as far as I was concerned, because I wasn't involved at all in the development; in fact, I hardly came back to Nevada at all during that period, because I was pretty busy in Canada.

## VII MANAGER OF EXPLORATION IN CANADA, 1962 TO 1970

Swent: So you were exploring primarily in Canada?

Livermore: Yes. I was made manager of exploration in Canada, and had a very interesting experience up there. We were exploring all over the country, from British Columbia to the Maritimes and up in the Yukon, and all over Canada really. I saw Canada from one end to the other. We were exploring for different kinds of things.

### The Icon Syndicate; A Good Copper Mine

Livermore: One of the first things we got into up in Canada which was again fortuitous--there's always a certain amount of luck in all these things--there was a syndicate that had been operating for a number of years called the Icon Syndicate. They were looking for copper. There were four companies in the syndicate, which was kind of a common way of operating in Canada. You'd get a group of companies together and form a syndicate, and that was sort of to spread the risk of exploration.

I was quite impressed with their manager, Andy Troop. I thought he was a pretty capable fellow. And just shortly after I arrived in Canada, one of the partners dropped out of the syndicate, so they were looking for another partner. Because of their manager's expertise, I thought it would be a good gamble for Newmont.

We took up that other company's position, so we became a one-fourth interest in that. Well, they'd been working for about five years, hadn't come up with much, but the luck of the game: within a year after Newmont joined this syndicate, this

Andy Troop came up with a really very fine copper discovery, which was a very, very profitable mine.

Swent: Where was it?

Livermore: It was up in Chibougamau, Quebec. This was an unusual type of ore body in Canada. Most ore bodies are steeply dipping. This was a flat-lying ore body. It was discovered from an airborne survey, and we found the outcrop on the ground, represented by just a few pieces of float.

We started exposing the thing, and it turned out to be a flat vein. We were able to just run workings right into this flat vein and start mining, and it required very little preparatory work. Most Canadian mines require a shaft, and a lot of complicated work. So we started just going in and mining this thing.

There was also a mill nearby that was idle, and we used this mill. It was not a big mine, but it turned to be one of the best returns on investment that Newmont had ever had, I think, because of the low capital costs. That was a very good little mine. So that was very lucky; we just happened to join this syndicate at the right time.

Swent: You can't do much in Canada in the winter, can you?

Livermore: No, that's not true. Actually, some of the best exploration is done in the winter, because you can get around the country better. In the summertime, it's very hard to get around, at least with mechanical equipment, because everything is boggy muskeg, whereas in the wintertime, everything is frozen and you can use snowmobiles and you can land on the frozen lakes with airplanes.

So you can do geophysical work better, you can do drilling better. Actually, in the winter the only thing you can't do is surface geological work, because everything is covered with snow. But as far as the follow-up work, which often meant geophysical surveys or drilling, you could do really very well in the wintertime, particularly when they developed snowmobiles, where you could get around and cover the country a lot better. Even though it would get down to thirty below, you could still work.[1]

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[1]See James Boyd, "Minerals and Critical Materials Management: Military and Government Administrator and Mining Executive, 1941-1987," Regional Oral History Office, The Bancroft Library, University of California,

Similkameen, British Columbia

Livermore: The other thing that we got interested in was out in British Columbia. Actually, this was something I guess that was brought in to one of our fellows in our Vancouver office. Somebody had been sampling a cut in the Transcontinental Highway from Vancouver to back East, and he had found that right in the road cut there was a little bit of copper showing.[1]

So our Vancouver geologist, Don Cannon, got me out there, and we decided that it was kind of a poor showing, but the geology looked interesting, and we should really follow up on it. We did a little more sampling and decided to drill this showing. There wasn't much around the showing, but we got moving out, and we did some geophysical work, and got some better indications. Later, we got some anomalies. That eventually turned out to be the Similkameen Mine, the large open-pit copper mine. So that was kind of interesting to follow that through from the first outcrop.

What was interesting about that was instead of having to build a road to this mine, we had to build a road away from it. We had to [laughs] divert the Transcontinental Highway around this pit, so we couldn't have found a better location, right smack on the Transcontinental Highway. When they were building the road, apparently they didn't notice this copper, and nobody paid much attention to it.

Swent: There was a river there that was a problem too, wasn't there?

Livermore: Well, that's right. A part of the ore was on one side of the river, and part was on the other. They had to build a big bridge across the river. It was very complicated, developing it. And yes, that developed into a large mine. It wasn't a highly profitable mine, but it's still running, actually.

Swent: When you were doing this geophysical work, did you do this yourself, or did you contract it out?

Livermore: No, we contracted it out. Some of the simpler surveys we would do ourselves, but a lot of the work we would contract out. There were a lot of contractors doing that work in Canada.

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Berkeley, 1998, and Joklik, op. cit.

[1]See McQuiston, op. cit.

Geophysics, of course, is very much utilized in Canada. You did hardly any work in Canada without doing some geophysics: magnetics or electromagnetics, or induced polarization--all of these different methods.

A lot of the work has stemmed from airborne surveys. The Icon Syndicate Mine was really indicated from the air, as an anomaly from the air, which we followed up on the ground and found this exposure. So a lot of these discoveries in Canada originated from airborne work, airborne surveys.

Swent: They have done a lot more with that than we have.

Livermore: Oh, yes. Because the terrain lends itself to it better. Of course one thing in Canada, you have tremendous areas where the bedrock is covered with a very thin film of glacial material, which we don't have down in this country so much. Therefore the ore bodies are invisible on the surface, and yet they're not very far below. There are a lot of geophysical methods that will penetrate through that glacial cover and identify these sulfide bodies. A lot of large mines in Canada were found in that way after the war--I don't know how many dozens of ore bodies. They had no surface expression at all, which the prospector of course couldn't have found.

And the rocks lend themselves to that type of survey, which doesn't work as well in the western United States. The rocks are not suitable. It works ideally in Canada.

Swent: So were you learning something at this point?

Livermore: Well, yes. I got into geophysics a lot, because we weren't using that too much down in the United States. So it was a learning experience, to see how useful geophysics could be in exploration. And a lot of the mapping was done by doing a geophysical survey; you could tell how to map out the formations, even though you couldn't see them. You could map them out just on the basis of geophysics. So it was very useful as a mapping tool, aside from trying to discover ore bodies.

So those were the two discovery highlights in Canada. I worked on a lot of properties that were interesting, but those were really the only two that developed into sizeable mines.

## Exploration in Ireland

Swent: You were also doing exploration in other countries out of the Toronto office?

Livermore: Well, that's right, yes. We had several other programs which I was supervising. One was a program in Ireland. We did quite a bit of work in Ireland, and at that time, Ireland was experiencing a boom which had been started by Canadians. Actually, Ireland was never considered to be a very mineralized country. There were a couple of really old mines, but there was no mining going on in the sixties.

But several Canadian companies got interested in Ireland, and came up with several interesting discoveries. We got involved in that, too, and we did some work on some properties, and drilled a few of them. We didn't come up with an ore deposit in Ireland.

Swent: What minerals were they looking for?

Livermore: Well, lead and zinc and copper. They found several quite large lead-zinc ore bodies.

Swent: Lead was what the Romans were looking for, wasn't it?

Livermore: That's right. But there was no recent history; they'd forgotten prospecting. There weren't any modern-day prospectors in Ireland. One of these deposits they found by just looking on the rock walls of a farmer's field. They found high-grade chunks of galena (lead sulfide) right in the rock walls, and the farmer living right there didn't realize it was anything very special. [laughs]

Swent: That's why Waterford crystal is so good, isn't it?

Livermore: Why, because of the lead?

Swent: Waterford crystal has a high lead content.

Livermore: Oh, yes. Yes, there are some pretty good lead mines in Ireland.

We weren't fortunate enough to come up with anything there, but it was interesting for me, because I traveled all around Ireland and saw quite a bit of the country.

Swent: And this was in the late sixties?

Livermore: That was in the late sixties, 1965, around in there.

## Exploration in Spain

Livermore: Then later, we had quite a program in Spain. I had a couple of geologists working over in Spain, and doing reconnaissance work. So I had an opportunity to travel around Spain quite a bit. We came up with some kind of interesting things there, but there again, nothing that really developed into a mine.

Swent: It's always amazing. You'd think by now that everything that could possibly be found in Spain would have been found long since, wouldn't you?

Livermore: No, that's not true, even though the Romans were mining there.

No, there are always things to be found. Of course, techniques change, and the metals of interest change. We looked at several of the old Roman mines, which was kind of interesting. When the Romans conquered Spain, they demanded a tribute in gold, and the Spanish had to deliver I forget how many tons of gold a year, so they had these enormous excavations with slave labor to deliver this tribute. They moved enormous amounts of material.

They had some very large placer operations, hundreds of thousands of yards. They would build a dam in a river there, and they'd let the lake build up behind the dam. It would be up above where they wanted to recover the gold. This would be placer gold that you'd wash in water. Then they would broach the dam, and this water would come rushing out, and then they would run it through these riffles and work these gravels down below. Then, they'd build the dam back up again, and then they'd broach the dam, and that was the way they did it. They washed some enormous amounts of material that way. Of course, with thousands of slaves, I guess.

But they had some other lode rock deposits. There was this one pit up by a place called Salavi, which was in hard rock, and they made an enormous big hole there, right up on the coast of the Bay of Biscay, on the northern coast of Spain. So that was very impressive, to look at those excavations.

Swent: But you didn't find anything--

Livermore: No, we didn't find any commercial deposits there. Several looked kind of interesting, but just didn't come up with what we were looking for there. So this is getting up to the late sixties.

## The Newmont Organization: Few, But Outstanding, People

Swent: So you went up there as a manager of exploration, and you became president.

Livermore: I ended up as president of Newmont of Canada, yes.

Swent: Was this a newly-formed company?

Livermore: No, it had been there all the time. It was just a subsidiary. We operated Canada as a subsidiary, Newmont Mining Company of Canada.

Swent: Did this represent any big change for you?

Livermore: No, not really. It wasn't a big organization; the title sounds better than it really is, because it was mainly an exploration organization.

Swent: You were going to New York to meetings?

Livermore: Yes. But we were pretty independent. We were allowed a lot of independence by Newmont. We set up our own budgets, and we pretty well ran the thing quite independently. A man named John Drybrough was my boss when I first went up there. He was the chairman, so he really was my boss all the time. He was the chairman of Newmont Mining Corporation of Canada, John Drybrough. He was a very remarkable man.

Swent: He was Canadian?

Livermore: He was a Scotsman. I guess he was born in Canada, although he was quite proud of being a Scotsman. He was a mining engineer.

But we were able to set up our own budgets pretty much, and operate pretty independently from New York.

Swent: Did you like that?

Livermore: Yes. Of course, Newmont was a very small organization. One thing I liked about Newmont was it was small, and you didn't

have to go through any layers of authority. Very shortly after I joined the company, I was reporting actually to the president, Fred Searls, which was kind of unusual. The total employees of Newmont, I think, when I was in the New York office, were something like sixty people, counting all the stenographers--everybody. It was a $400-million company with only sixty employees.

Swent: Including someone who came in every morning to shine their shoes? Were you there in that era? Bob Shoemaker told me that somebody came in in the mornings to shine all the shoes.

Livermore: Well, actually, Fred Searls used to have somebody come in, yes. Yes, it was an amazing organization. They had just a few men, but very outstanding people. One was in charge of one department, one was in charge of the Magma Mine in Arizona, the other was in charge of the South African things, and there was a group of very remarkable men.

Swent: Who were they?

Livermore: W.T. Smith was in charge of the very successful development of the two mines which Newmont acquired in South Africa: Tsumeb and O'Okiep. Henry Krumb, one of the most famous mining engineers of that period, was responsible for the evaluation of porphyry copper deposits in the early twentieth century. Ed McNab was responsible for developing the great Magma copper mine in Arizona and later, San Manuel Mine. Each was given considerable authority by Fred Searls to manage their own operations. Phil Kraft was in charge of the Canadian operations. Plato Malozemoff came in later.

Then they had a few roving geologists--I was one of them --sort of roving around the world. It was kind of an interesting organization. I think they always said that Newmont got a lot of miles out of their small number of people. [laughing]

Swent: And it wasn't all men, either. They had a woman on their board early.

Livermore: Well, that's right, they did. Yes, that's right. She was quite a person.

Swent: That wasn't the usual thing in those days.

Livermore: No, that's right.

Towards the end there, I was getting a little restless in Canada. I really missed being in the West. I was from the West originally anyway, and I realized that if I stayed on there, my future at Newmont would either be to stay in Toronto or else move to New York, so I wasn't too keen on that.

Swent: There was something on the French Riviera.

Livermore: Well, that was an examination.

Swent: That wasn't tempting either?

Livermore: No. I think I mentioned that one of the projects that I was supposed to examine one time was on the French Riviera. But I decided I'd probably better not go look at it, because if I turned in a favorable report, they would certainly [laughing] think I was maybe biased. So I didn't look at that one.

But anyway, my work was becoming a little bit too administrative for me. Although it really wasn't a very big organization, I missed the field work. So I decided I wanted to get back into something more closely related to field work.

And I always had in my mind to go back to Nevada, because I still thought there were other ore bodies to be found besides the Carlin Mine. Because actually, after the Carlin discovery, there was a tremendous amount of activity, but there only was one deposit found, strangely enough, of that type. That was the Cortez Mine, which was a much smaller deposit.

Swent: That was not Newmont, was it?

Livermore: No, that was Placer, a Canadian outfit. And everybody thought right away they'd find a whole bunch more like the Carlin, because of the fact that it wasn't pannable. A lot of major companies did an awful lot of work, and they kind of--I don't know. They were looking for an exact duplicate of Carlin, of course. It had to be in a window, it had to be in the right rocks. And they just didn't find any.

So the interest fell off. Newmont went into production in 1965, and I think shortly after that, the people sort of forgot about Nevada.

Swent: But Newmont developed a lot of other mines there.

Livermore: Not Nevada. That was much later. No, in fact, Newmont gave up. It's funny, because Newmont even had a policy--you see, at $35, a lot of these mines in Nevada were somewhat marginal.

And even though the Carlin deposit was quite profitable, it didn't compare with the porphyry copper ore bodies. And there was a period of time even when Newmont had decided that these gold deposits in Nevada were too small. [laughs] That seems funny. And actually, Newmont really stopped exploring in Nevada for a period of years there.[1]

But anyway, I had the idea that there were more of these things to be found, and of course, although the price of gold was $35, everybody thought the price was going to go up. You never knew when, but I think that was pretty generally known, that the price couldn't stay at $35. So I thought that there were still some possibilities in Nevada, and I liked the idea of going back to Nevada, because I enjoyed working there, and getting back into more field work.

So I decided, well, I'll see if I can get some backers to go to Nevada. I hadn't been able to do it back in 1949, but at this time, I did have a little success behind me, so I thought I might be able to talk some people into exploring for gold, which wasn't very popular at that time really. Nobody was really looking for gold. Everybody was looking for copper and other metals.

Swent: Precisely what time are we talking about now?

Livermore: That was 1970.

Swent: You were still working for Newmont at the time?

Livermore: I was still working, but I had told them I was going to leave.

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[1]For more on Newmont, see William A. Humphrey, "Mining Operations and Engineering Executive for Anaconda, Newmont, Homestake, 1950 to 1995," Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 1996.

## VIII CORDEX SYNDICATE

### Forming the Cordilleran Explorations Partnership with Pete Galli in 1970

Livermore: I had some connections in Canada, and one of the partners in the Icon Syndicate was a company called Rayrock Resources Limited. Later the name was changed to Rayrock-Yellowknife Resources Limited. The president of Rayrock was a very fine man. His name was Jerry Byrne. He and I got along quite well, and so I approached him with the idea of setting up a syndicate similar to the Icon Syndicate, of three or four companies, to explore for gold in Nevada.

He seemed interested, although I must admit that it was kind of brave exploration, because nobody had been looking for gold much, and he didn't know much about Nevada. But I convinced him that there were some possibilities in Nevada, so he thought it was interesting.

So then the question became, how do we get some other companies? And I talked to some other people that I knew, and didn't have a lot of luck, but finally got another company. And then Jerry Byrne himself was really--I have to give him credit for it. He's the one that really talked some of his own friends in Toronto into going into this syndicate.

Swent: You still called it Rayrock?

Livermore: No, it was called the Cordex Syndicate. We did finally get four companies together, so it looked like this was going to shape up.

In the meantime, I had gone back to Nevada to kind of look around, and I decided that I had been away from Nevada for so long, I was sort of out of touch with what was going on out there. I mentioned earlier that I had known Pete Galli back in

1961, and I was impressed with him as being a very competent geologist. Also, he was very well acquainted--he'd been there right through this last eight-year period, and he knew what was going on, knew everybody out there.

Swent: He was working for Union Carbide?

Livermore: He worked for Union Carbide. And I got talking to him, and it turned out that he was in a similar situation with myself. He sort of wanted to get out, away from this large corporation. He was intrigued with this idea, so we formed a partnership. We were the managers of the syndicate, and we called it the Cordex Syndicate.

We were sort of puzzling what name to call our partnership, and I guess I came up with the name which later turned out to be not the best name. I thought, well, we could be exploring from Alaska down to the tip of South America; we weren't confining ourselves to Nevada, really, because we were going to look for a lot of other things besides gold, particularly at that time. So gold was part of it, but we were looking for copper and later uranium and various things.

Anyway, the chain of mountains which extends from Alaska to Chile is the Cordilleran Chain, so that seemed like a good name. Cordilleran Explorations. And it gave us a lot of latitude there.

Swent: [laughs] Yes, considerable.

Livermore: Well, it turned out that was not the best name, because people didn't know how to pronounce it, for one thing. Whether it was Cor-dill-eran, or Cor-dill-er-an, or--anyway, we used that name. The syndicate itself was called Cordex Syndicate.

So we started off with a three-year budget, modest budget, and we opened an office in Reno and hired a geologist, and started following up on some of the ideas that both of us had. As I say, on the original go-around, I think they had had too narrow a model. They were looking for an exact duplicate of the Carlin discovery. There had to be a window; it had to be in a certain formation. We thought there were some other areas in the state that had some of the similar characteristics, but weren't exactly duplicates.

## The Pinson Mine

Livermore: One of our first projects was up near the Getchell Mine, which I had known from the 1940s. There was an old showing up there that had been worked by the Getchell Mine, a little pit. It had been mined out, just a small tonnage. It looked interesting to us, and we thought that it would have some possibilities for an extension along a structural trend.

So we leased this property--

Swent: What was it?

Livermore: Well, it was an old pit there called the Ogee-Pinson Pit. There was a prospector called Pinson who discovered the area. The Getchell Corporation mined a small pit and then hauled the ore up to their mill. It was about seven miles south of the Getchell Mine.

We thought it was worth a little work, so after mapping the area pretty carefully, we laid out a drilling program. Some other people had worked on this area, including Homestake, but they had given it up. But we thought it still had some merit, so we laid out a twenty-hole drilling program, which I thought was a fair test for this area.

Our first holes were not too exciting, actually, and by the time we got to the twentieth hole, that was the end of the program. We hadn't received the assays yet for the final holes, so the program was finished, and we sent the drill away.

Well, when the assays came in, on the seventeenth hole we hit a pretty good showing which turned out to be the Pinson orebody. So that was again a little bit the luck of the game. What it shows is that you have to drill a lot of holes on these deposits, because Homestake had drilled only two holes, and in fact, they drilled right through the ore body, but it happened to be poor at that spot. So they walked away from it.

So then we had to bring the drill back, obviously, and we drilled this thing out, and then it turned out to be a pretty good small ore body.

Swent: And it's still going.

Livermore: It's still going. But at that time, it was not economic, because that was still $35 gold. But we knew we had something and it was quite interesting. That was in 1971.

Swent: The official price of $35 was changed in 1968.

Livermore: Nixon raised it to $42.

Swent: Right. Wasn't that in 1972?

Livermore: Maybe it was, but it didn't really start going up until much later, until about 1977, 1978. So we just sat on the property.

## Whit DeLaMare and the Preble Mine

Livermore: In the meantime, we were doing more prospecting in another area, and we had hired a prospector by the name of Whit DeLaMare--I think you have his name, don't you?

Swent: It's in the New Yorker article.[1] Were you doing any of your own prospecting at that time? Were you out in the field?

Livermore: Oh, yes. But we had several of us, and we were all out there prospecting. But he was a full-time prospector; that's all he did. Whereas we had to do some follow-up geological mapping, all he did was go out and do initial reconnaissance, and very successfully.

He was an interesting person, a mining engineer who had had various operating jobs in mines. He had his own company, as a matter of fact, own iron mining company for a number of years. But he was at that time somewhat footloose, and living in Winnemucca. He had several operating offers, but he didn't want to leave Winnemucca. So he got sort of interested in geology and prospecting, and he knew the area quite well.

Pete Galli had known him quite well, and so we got talking one time. It's pretty hard to prospect on your own, because the cost of assaying runs up. He didn't really have quite the resources to prospect on his own, so we asked him, "Why don't you go to work for Cordex?" Which he did. We hired him, and we paid him a salary, but with a bonus for anything he found.

So he was prospecting this area about fifteen miles south of the Pinson. Actually, before he worked for us, he had liked

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[1]"A Reporter at Large: Invisible Gold," by John Seabrook, April 24, 1989.

the looks of this area. There was no known gold there, but he liked the looks of this area, and he decided to stake some claims. After we hired him, the first job we gave him was to prospect his own claims. [laughter] And by gosh, he started coming in with some values on the surface.

This was what turned out to be the Preble deposit, about fifteen miles south of Pinson. He first got just a few little chips, float chips of little value, but one contained some gold. It was interesting, because right away we recognized that even on the basis of one sample, this looked like Carlin-type mineralization. This is what we were always looking for. It had the characteristics, the right kind of rock, the right kind of alteration.

So even though it was only one sample, immediately it looked very interesting to me, and we followed up on it. Then we started getting a few values around it, and we put in a bulldozer trench just like we did at Carlin, and sure enough, we found a wide zone of mineralization there. But there weren't any outcrops there, actually.

Then we started drilling, and it was pretty simple. We drilled out a very nice little orebody. That turned out to be the Preble orebody, which was smaller than the Pinson. And that wasn't economic either.

Swent: At that time.

Livermore: At that time. So we just sat on that one.

## The Sterling Deposit

Livermore: Then we went down into another area, and I was doing the prospecting in this area. I went down to an area with the same kind of rocks as were occurring down at the Carlin. This was down in central Nevada. I got prospecting around there, and there were a couple of little tiny pits that had some gold values that appeared to be Carlin-type mineralization, so that seemed a little interesting. But at that time the property was tied up. Later Whit DeLaMare found that the owner had died, so we staked a group of claims.

We went in and drilled, and [laughs] we were lucky again, because there were some narrow ore bodies that were not exposed at all. So that original showing didn't really amount to much,

but near there--we started drilling around there because the geology looked interesting. We kept going. That's one thing we did do; we did a lot of drilling. We didn't give up on just three or four holes.

So we were drilling out along this structure, and by gosh, we hit another blind zone, which turned out to be the Sterling deposit. Now that again was one that was uneconomic at that time. It was even smaller than the Pinson and the Preble, and then it also appeared to be an underground situation, so it wasn't quite as attractive. It wasn't open-pit.

Pete and I thought this was quite interesting, and we tried to get the syndicate to do more work, but they thought this thing was too small to hang on to.

Swent: You had to have quite a lot of capital to sit on all these properties.

Livermore: Yes, that's right. So the way the thing worked was that if they weren't interested in a property, they would deed it back to us. So that's what happened. They deeded that property to us, so we ended up owning it. Instead of just a part of it, we ended up with the whole thing. That was Pete Galli and myself, Cordilleran Explorations, the partnership.

Swent: What was your incentive? This would be an incentive to find places with low values so they'd deed them back to you, wasn't it?

Livermore: We didn't think about that--we were looking for economic deposits.

Anyway, it was too small for us to do--we knew we wanted to hang on to it, but the gold was still $35 at that time. All these three were found when the gold was $35. And you might say we were the first really to start the new wave of gold exploration in the seventies. There were very few working in Nevada in 1970.

Swent: I would think people would have been following you around by now.

Livermore: Well, people weren't too interested in gold at that time. So the Pinson discovery was really the first discovery in this new, modern wave in 1971.

And then others started to become interested. A bunch of people started working, and it gradually developed into a big boom. But when we went to Nevada, our timing was perfect, as we practically had the whole state to ourselves really.

Swent: Were you prospecting on public land only?

Livermore: Mostly public land, yes. And anyway, we had a small organization--I'm getting off the subject a little.

Swent: No, that's okay.

Livermore: I'll finish up on the Sterling.

Pete Galli and I ended up with that, and we knew we wanted to hold on to it, but a fellow came along who was interested in it, and we didn't really have the resources to follow up; the next stage would be more drilling. So a fellow came along and wanted to lease the mine, and we decided to lease it to him.

Swent: Who was that?

Livermore: A fellow named Greg Austin. He had a little bit of money, and he took a real gamble, a big gamble, and drove a drift in to some of these drill holes we had found, and he actually ran into some very good ore. He made that into quite a good mine. The Cordex Syndicate made a mistake in dropping it, because it developed into quite a good little mine. It's still operating an underground mine. Of course, we got the benefits of some royalties out of it, but I always felt it was too bad that we didn't talk the syndicate into holding on to it, because although not a big mine, it's been quite a nice little producer.

And they're still finding more reserves there. They found a couple of other ore bodies that even we must have missed in our drillings. That turned out pretty well.

## A Defense of Prospectors

Livermore: So, anyway, getting back to our organization, we had a small organization. We had about four or five geologists working, and we always had one prospector. One thing we did was kind of reintroduce the idea of prospecting. People in the States didn't necessarily believe in prospecting. They thought you

had to have either a geologist or more sophisticated exploration, but my experience in Canada indicated that prospecting was still very useful.

Something about the prospecting instinct is different from the geological ability. A lot of geologists are not really very good prospectors. They get very interested in the rocks, and sometimes they don't have the one-track mind of finding mineralization. And prospectors, without a college degree, can often be in some ways better than geologists, because they are very persistent, and they get interested in an area, and they'll go over it with a fine-tooth comb.

And of course, that turned out to be true with this Whit DeLaMare, because although he did have a college degree, he wasn't a trained geologist, but as I'll mention later, he came up with another big discovery for us. So he was a very, very competent prospector.

## Incentive Bonuses

Livermore: Anyway, we introduced the idea of prospectors, and also the idea of an incentive bonus, which I always thought was a good idea. There again, that came from Canada, because they didn't do that much in the United States. Canada was very strong on that.

Swent: Did they get a percentage of what they found, or a cash bonus?

Livermore: Often it had a cap on it with a certain limit, but it was a chance to make a really good stake. In fact, this Whit DeLaMare--he has since died, unfortunately--will end up with, I don't know, a couple of million dollars. So it's quite a big stake that he will earn out of these discoveries. So it isn't just peanuts. Some of them are smaller, though. We were fairly generous with them.

Swent: But what you gave them was a percentage?

Livermore: Well, a lot of them had a cap; a common cap was $400,000 or $500,000. But our deal with him didn't have a cap on it, so his family now will end up with a good sum of money.

Swent: Is there just a difference in terms between that and the royalty?

Livermore: Well, the royalty of course is open-ended, and this was not. Some of them are based on royalty. They're more often based on net, though. We had an interest in this thing ourselves, of course. We had a chance to earn an interest, and then, in effect, we gave the prospector a certain percentage of our interest, which was a net interest. So it wasn't a royalty interest. It was based on net.

Swent: So this is a good incentive, then.

Livermore: Yes, it was a very good incentive. And I think all the other companies do that now. There are different abilities. You have to have the person who goes out on the ground and does the reconaissance and comes up with some kind of a showing, maybe just one sample, and then you have to have somebody to follow along to evaluate that, and that's where the geologist comes in, of course. He'd come in and evaluate the prospect--and that's of course what I did a lot of myself, reviewing some of the things that the prospectors brought in to try to decide whether they were worth working on, whether we wanted to spend some real money on them. You have to look at the rocks.

So the geologists had a sort of, you might say, the second stage, and they would come in and map the area and prepare for drilling and supervise the drilling. But it's the guy that goes out first who is very important, after all. Without him you wouldn't have anything, so I always gave a lot of credit to the prospectors, because they led you to the area in the first place.

Swent: Do you consider yourself a prospector?

Livermore: I do, absolutely. I always considered myself a prospector. Yes. I like that part of it; I always have.

So anyway, we had a small organization. We had about six or seven people, including a secretary, and that was the size of it. We never made it any bigger. I had a lot of opportunity to increase the staff, increase the budget, particularly when gold started booming. But I just liked the idea of a small organization. I think there's something to be said for it. Everybody has more individual incentive, you don't have to have layers of authority. I'm not involved in the organization any more; I retired, but it's still about the same. It's still going on. Cordex has been going for twenty-two years now, which is pretty good.

Cordex Exploration Company, 1973 to 1984

Livermore: After the first three-year contract was up, Pete decided that he wanted to do a similar thing on his own, which was very understandable. Then I just carried on from there alone.

Then, I changed the name, partly because it was not a partnership any more, and we had this trouble with Cordilleran anyway, so I changed the name to Cordex Exploration Company. So it's been operating ever since then as Cordex Exploration Company, and it still is. When I decided to retire in 1984, Andy Wallace took over. I had a contract with these Canadian companies, and they would fund the exploration, but I had the right to earn an interest at a certain point in any discovery.

We operated as J.S. Livermore, doing business as Cordex Exploration Company. In 1984, I deeded the few assets--office equipment, library, etc.--to Rayrock so now they operate as Rayrock Mines, Inc, dba Cordex Exploration Company. There is a new partnership for every mine. Over the twenty-two years, there were actually seven different syndicates.

Swent: So it's still the same Canadian people that are in it?

Livermore: Well, over the years, the companies have changed. For one reason or other, one company would drop out, depending on their financial situation. So we've had a number of changes in ownership, quite a few over the years. In fact, I think right now it's down to basically Rayrock. But I guess we've had five or six companies at various times, and every three years, we've renewed the thing, and then sometimes the companies would change. But it's gone along. Of course, the budgets have gradually increased.

Swent: Have you done anything outside of Nevada?

Livermore: Yes, we did. We had a program in Alaska which was copper--we were farther afield. Oh, yes, we did a lot of work. We did work in Arizona, and we had quite a program in Idaho. We did some work in California. No, we were working over all the Western states, including Alaska, but we kind of decided against Alaska at one point because Alaska is terribly expensive to operate in.

You just get so much more for your exploration dollar in the lower states, and particularly in Nevada. Nevada's just an ideal place to work. It's so easy, it's accessible, and the

climate, and the geology--everything is very favorable about Nevada.

So the majority of our work always was in Nevada. But we started off--originally, we did a lot of work on copper, because copper was kind of interesting at that time. Then, the uranium boom came along, and we actually did some work in uranium. Not in a big way, but we had some properties.

In fact, we had a pretty good uranium property up in northern Nevada which was not quite economic. It was pretty close; it was a pretty interesting deposit; there was a neighboring property, and it almost looked like that area would go into production, but then the price of uranium fell down, so that didn't materialize.

Swent: This was a little late for uranium, wasn't it?

Livermore: No. Let's see. It was sort of at the tail end of the uranium boom, yes. Nevada wasn't considered one of the hot areas of uranium, but towards the end of the uranium boom, there was a fair amount of work done. Nevada never did develop a commercial uranium deposit. This was up in northern Nevada, up near the Oregon border.

But let's see. I don't remember what years that would have been. It was in the late seventies, '78 or something like that. But anyway, that didn't develop into a commercial ore body.

As time went on, we concentrated really more on gold, because the price of gold was going up, and everybody was looking for gold. And we had certain expertise there anyway. Towards the late seventies, the price of gold increased rapidly. We kept looking at these deposits, the Pinson deposit and the Preble deposit, and we'd make a feasibility study on them at various levels, and they didn't seem to be quite attractive, or attractive enough. At one point, we almost did decide to put Pinson into production, which would have been a mistake.

Anyway, we finally put it on ice again, and then in 1980 --by that time the price of gold was up to about $250--so then the Pinson looked attractive, so we decided to put the Pinson in production. So we built the mill, and--

Swent: Was there plenty of water there?

Livermore: Oh, yes, no problem. There was water there. Most parts of northern Nevada, you don't have much problem with water. By drilling, you can almost always get water.

There again we were lucky, because as we were building the mill, the price kept going up and up. In fact, when it hit its peak was December 1980, when it got up to $700. Unfortunately, we weren't quite ready to go into production then, because we didn't get going until May of 1981. By that time, the price had dropped, but it was still $600.

Swent: Still way up.

Livermore: So we sold a lot of gold at $600. The Pinson Mine, of course, was a wonderful investment. We got our capital investment back in thirteen months, and that was remarkable. So that was wonderful timing. There was one other operation, Alligator Ridge, but we were the first of this new wave of production to construct a full-fledged mill. Alligator Ridge was a heap-leaching operation.

About that time, of course, all hell broke loose in Nevada, and everybody was rushing into the state. Shortly after that--well, not right after that, around '85--they started clicking off all these other discoveries, you know. And gosh, the Paradise Peak and Jerritt Canyon, and of course that's when they found these enormous extensions of the Carlin belt, you know. Tremendous extensions, enormous low-grade bodies, and then all these deep high-grade bodies. That all came along much later, and all of a sudden, the whole thing just sort of exploded. A tremendous boom. You know that the production in Nevada in 1981 when the Pinson opened I think was 200,000 ounces. And in 1991, it was 6 million ounces. Pretty amazing.

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Livermore: So that was a fascinating period.

It was just unbelievably lucky timing, because I guess we took a gamble, although everybody knew the price would go up. But we were right in on the ground floor, and we saw the whole thing start from nothing, just go up to this enormous boom. And now, of course, the boom has really fallen off, and you're sort of back to normal. But it was an unbelievable period there in Nevada.

## Florida Canyon Mine

Livermore: The Florida Canyon was one that I had prospected and we'd done some work on. That was another situation where we found some low grade, and the syndicate weren't too interested in that, so they turned that property back to Pete and me. We eventually sold that to another group, and that became a producing mine, too. It's still a very low-grade mine, but I guess they're maybe making a little bit of money.

## Dee Mine

Livermore: The next thing that came along was when we found the Dee Mine. In 1980 was when we made the first discovery--that was again by DeLaMare. He was prospecting around up north of the Carlin belt in an area that had been covered quite extensively by a lot of people, but he had such a good eye for ore that he picked up a sample, just one single sample on the surface that had very good values in it. He was on some ground that was already claimed by somebody, and anyway, he brought me out there to look at this thing.

It was only about a mile and a half from an existing mine, from the Bootstrap Mine, so that made it interesting. I looked at the sample, and we checked it in certain ways, so we were pretty convinced that this was a Carlin [type] occurrence. So I got really interested in this thing, and we couldn't do much work on this ground, because it was held by someone else, you see. Otherwise we would have done a lot more sampling before tying it up.

So I had go around to the owner, who was a very strange fellow, and try to make a deal with him, because I really thought this was property we had to get, just on the basis of one sample, really. So I talked to him for a while, and he wasn't interested at all. "Oh, no, I don't want to deal with this property." I kept working on him, and I actually took him over to the Pinson Mine opening, and he was kind of impressed at that.

Swent: It's the Dee that you're talking about now.

Livermore: The discovery was made in 1980, because I took him around to the Pinson Mine opening, which was in 1981, and he was

impressed with the Pinson Mine. He thought we were maybe pretty good operators.

So we finally made a deal with him. It was a very tough deal. He drove a hard bargain. His name was Phil Davis, and I could go on for a couple of hours on Phil Davis. He was in the New Yorker article. Anyway, he demanded a very large cash payment within a very short period of time. It was actually $100,000, which is kind of unheard of in mining, to have to put up $100,000 in ninety days on the basis of one sample. But I had figured that--it looked to me like a Carlin occurrence, and I figured if we were lucky, we could get a couple of drills in there and punch some holes down very fast. If we were lucky, we could get enough encouragement to justify the $100,000 payment.

So actually, that's what we did, and the minute the agreement was signed, we had a drill in the ground the next day.

Swent: You couldn't do any more sampling first?

Livermore: No.

Swent: He wouldn't let you?

Livermore: No. Well, no. He really didn't want to know. It was a kind of a funny deal. I think we just had to move on it. He was a very erratic type of guy, and you never knew whether he would just say, "Forget about it." As it turned out, we were lucky enough that we got some pretty good drill holes, and we were able to justify this $100,000 payment.

Swent: On the basis of one sample?

Livermore: So we gambled between the drilling cost, and we gambled a couple hundred thousand dollars on one sample, so that was kind of risky [laughing]--. But it did pay off, it turned out to be a pretty good mine.

Swent: And you named it for DeLaMare.

Livermore: We named it for DeLaMare, yes. Because he picked up the first sample, and that's the most important.

Swent: You should probably mention the lawsuit at least.

Livermore: Yes. Well, a lot of things about Phil are in the New Yorker article. So when he came to make the payment, I went to Phil

Davis and I said, "Well, Phil, do you want this in the form of a check, or we can give you a cashier's check if you want."

He said, "Oh, no, I want cash." [laughter]

So that stopped me for a minute, so "Okay."

So he said he'd be in Reno a certain day. I called up the bank in Reno and I said, "I'm going to need $100,000 tomorrow."

"Oh," he said, "gee, in Reno we don't keep that much extra money around, in cash. But we'll have it the day after tomorrow."

So anyway, he [Davis] came down to Reno, and we went down to the basement, and of course, they don't use any big bills any more because of the drug stuff. So we had to count out one thousand hundred-dollar bills, which was quite a job in itself. [laughs]

Swent: What sort of stack is that, I can't imagine!

Livermore: That's the thing. He had a satchel with him. So we counted them all up, and he counted it, and so he put all his bills in the satchel. He lives up at Battle Mountain, which is about 200 miles from Reno. So he was ready to take off in his pickup. I said, "Phil, are you going to drive all the way back to Battle Mountain with $100,000 in cash?"

He said, "Oh, no problem, I've got my .357 Magnum with me." [laughter] Story out of the Wild West.

So anyway, he did. He took off.

The tragic part about it, he didn't believe in banks. He buried the money under his trailer, and somebody had found out about it, and they lured him out of the trailer, beat him up, and took $50,000. So I guess after that, he decided he'd better put the money in the bank.

Then we went ahead and put the Dee Mine in production; it went into production in 1984. I got along very well with Phil Davis, but then we had sort of a falling out. He's a person that doesn't trust anybody, and it turned out that he could hardly read. We didn't realize that at the time. We thought it was kind of funny that he didn't seem to look at the agreement too carefully. He'd say, "Well, I'm just going to take this to my lawyer." Apparently, he really could barely

read, and so then later on, he got sort of turned against us. He accused us, and he sued us, for fraud actually. He said that we took advantage of him in signing this agreement, which was an extremely tough agreement in his favor.

But anyway, we went through a lawsuit, and it was just kind of unpleasant. There was some question of interpreting the agreement, and it was kind of a hassle. We finally got that resolved, but that was kind of an unfortunate incident. He was an unusual fellow.

Swent: Is he still there in Battle Mountain?

Livermore: Still there. And he gets all this money--he's been getting over $1 million a year from this mine, and his lifestyle really hasn't changed much. He still lives in a little trailer in Battle Mountain. We always wonder where all the money goes. Some story is that some religious organization is getting a lot of his money; I don't know. Doesn't have any family.

Swent: Has his gold Cadillac.

Livermore: He's got his fancy Cadillac, yes, with a neon sign on the back that says, "Davis Mining Company." And he bought a yacht, which he parks out in front of his trailer. I don't think he's ever used it.

Swent: Somebody said that his feelings were hurt because you didn't name the mine for him?

Livermore: Well, that was very true. Yes, that was a mistake we made. I always felt it should be named for Dee, but Davis didn't like that. That was part of the problem. If we'd called it the Davis Mine, he might not have sued us. He didn't know there was any gold on his property. He had a little barite on his property. If he'd found the gold it would be one thing, but he didn't even know this showing existed at all. We found the gold on his property, so I don't know why he should have gotten credit for it.

Swent: Didn't you say he wanted a barite mine?

Livermore: Actually it was very funny, how he happened to stake the claims in the first place. He had some promoter backing him, and he came to a friend of his in Battle Mountain, and said, "I got this guy that is interested in investing in some gold mining out in Nevada. I want to get some claims; where do you suggest I stake some claims?"

This fellow said, "Why don't you just stake alongside me?" So that's exactly what he did. He just staked alongside this friend, and it turned out to be the Dee ore body. So he ended up getting several million dollars, not because of his prospecting ability.

Swent: Well, I guess sometimes it is just luck, isn't it?

Livermore: Yes.

Swent: But that's still a good mine?

Livermore: Well, yes, it's going along. The big potential part there is at depth where we haven't really started testing. We may have some of this deep ore like some of the other mines, like the Barrick does. But that's something we haven't tackled yet. That's very expensive, to test for that deep ore.

But that brings it up to 1984. I had hired Andy Wallace from the University of Nevada, and he had done an outstanding job for us, and I thought very highly of him.

Swent: He's a geologist also?

Livermore: He's a geologist. I thought that maybe I would like to get away from some of the routine of running Cordex, and he was my assistant and I thought capable of the job. So in 1984, I decided to resign, or actually to sell Cordex. I had the Cordex Company, which I sold to Rayrock, and Andy Wallace took over and ran the job. He's done an excellent job really, outstanding, including finding another ore body, the Marigold ore body, which is also in production. That's a very fine ore body that Andy Wallace found.

Swent: You're still connected with Cordex, though?

Livermore: I'm not connected with Cordex, other than as a consultant. I'm not financially involved in Cordex. But they're still continuing, and the company has changed. I think right now they're down to just maybe two companies that are in the syndicate, but it's still going on, about the same size crew. So as I say, it makes twenty-two years, which is quite a record for the exploration organizations in Reno; they come and go.

Swent: Twenty-two months is good for some of them.

Livermore: They have a big hiring spree and then they lay them all off. But Cordex has just kind of plugged along, at an even keel, and so it's worked out pretty well.

Swent: I've got their office as one of your telephone numbers.

Livermore: Well, I still have an office over there, actually. And I get mail over there. But I don't spend much time over there. I spend most of my time over at the other Public Resource Associates office.

So I guess really, that's sort of the end of my mining.

Of course, being a prospector, I'm particularly interested in discoveries, so in some ways the highlights of my life are all those--but I've done a lot of other things, too.

I did continue, and of course, I'm still continuing, but I had some interesting experience in Colombia and Ecuador, and that comes later. Because after I left Cordex, then I've been dealing with various projects of my own, including work in Colombia, which is kind of interesting.

Swent: No, you haven't mentioned that at all.

Livermore: So I can get into that maybe next time. Central America and Honduras.

## IX EXPLORATION ABROAD, AFTER 1984

[Interview 4: January 20, 1997] ##
[This interview was conducted by Maurice Fuerstenau, Echo Bay Professor of Metallurgy, University of Nevada-Reno]

### In Colombia, Small Operations Not Worth the Risks

Fuerstenau: John, you sold Cordex in 1984, and I believe your next project was in Colombia. What was the project, and how did you become involved?

Livermore: I was kind of footloose after selling the company, and I was interested in doing some exploration work. I've always been kind of interested in foreign work, having spent quite a bit of time in foreign countries. The president of Rayrock, a company I'd been associated with for many years, had a contact in Colombia--a friend of his who had some properties in Colombia--and wanted some opinions on the value of this property. So Dave Crombie, the president, called me, and asked me if I wanted to go down there and take a look at these properties. That sounded kind of intriguing, so I did go down and I talked to this fellow who really didn't know much about mining, and it turned out his properties were really not of any great value, but I got sort of intrigued with Colombia, looking over the geology of the area, and the history.

They had quite a history of mining, particularly gold mining. I thought, well, maybe I'll just kind of look around the country a little bit to see if it could generate any exploration projects. So I did; I traveled around. I made three or four trips down there, and I spent a few weeks all together touring, and I got onto some kind of interesting things. So I told Dave Crombie that maybe we should mount a little program down there, and I suggested that we bring a young geologist down by the name of Charlie Ronkos who had worked for me in Nevada and who spoke Spanish. So he agreed to that, and Charlie came down to set up an office down there.

The idea would be that he would be there permanently, and I would be sort of supervising, and going back and forth occasionally. Anyway, we had one interesting incident. There had been some talk about kidnapping and robberies in Colombia, and I told Charlie, "Don't worry about that, those are all exaggerated stories."

I picked him up at the plane in Bogota, and the next day we went out to ride a funicular railway going up to a viewpoint, looking out over the city. On the way back, we took a short cut to the hotel, not over the main traveled route. As we were walking along, a couple of teenagers jumped behind us and stuck knives in our ribs and took all our money and credit cards. So it became kind of a joke after, and in fact, in Reno, it became quite a big story that we had been robbed down there.

Anyway, we continued and we set up office, actually, in a town called Medellín. That's the second biggest city in Colombia in the northern part of the country, and it's the center of mining. So Charlie set up a shop there--an office there--and hired two young Colombian geologists, and we found out later that Medellín was the center of operation for the drug lords in Colombia. [laughter] I used to walk around, going from the hotel back into town, just walking along the roads, and finally some people told me that that's not a very good thing to do in Medellín, so I stopped that.

We had one incident where we were stopping to get some gas at one place, and there was a taxi parked over to the right of us, and another taxi came in, and he was obviously very annoyed at this taxi driver for stealing one of his fares or something, and he rushed out of the taxi and charged over; I thought we were going to have a good fist fight. Instead, he pulls out a gun and starts shooting at this fellow. That's the way they settle the arguments, and we were right there in the line of fire. Actually, I didn't realize it at the time, but we looked later and we had a bullet hole; one of the bullets went into our jeep. [laughter]

Anyway, we continued there for quite a while; this program went on for a couple of years. Both of us traveled all over Colombia--very interesting. It's a beautiful country, and we saw a lot of interesting properties. We never did fully get into anything that had the size we were looking for. There were hundreds of little mines in Colombia. Colombia was really one of the main sources of gold for the Spanish empire, and there were hundreds of little tiny mom-

and-pop operations which we could see all over the place. None of it seemed quite big enough for us, but we kept looking. One of the interesting things was to see all these little operations which were just like what California must have been back in the 1850s, because you have dozens of little operations with *arrastras* along the streams and small stamp mills, and it was fascinating to see these people operating because there's plenty of water everywhere, so there's never any problem with water to run their *arrastras* and their other mills.

Anyway, we had a couple of other incidents that concerned us a little bit. One time we visited a mine and after landing in a little airport there we learned that the guerrillas had taken over the airport, so we got sort of stuck there for a while until they finally cleared them out. We were up in another area--we spent some time up in this small farm--what they call *fincas* in Colombia and we were staying there with a woman who was operating this little farm up there, and she cooked for us, and we stayed up there for a couple of weeks; it was really quite pleasant. Finally, when we were getting ready to leave, we heard that that had been the headquarters, just previously, of one of the guerilla operations in that area. We knew they were around there. Of course we were moving around a great deal, so we weren't that concerned.

One thing we were concerned about is if we really got to the stage of drilling that we would become kind of sitting ducks for the guerrillas. That was the one thing that kind of discouraged us. There was a case of an American being kidnapped right in the lobby of the principal hotel in Bogota.

We finally got a little concerned about Charlie Ronkos, and finally decided to terminate that program. It was a very interesting experience. I enjoyed it down there.

Fuerstenau: When you went down there, as I recall, a former army colonel was going to look after your safety. How did that work?

Livermore: Well, we thought we ought to have some military help there, because we knew of the guerilla problems. So we hired this fellow who was actually a senior retired colonel who had actually been in Korea and headed up a Colombian battalion there; we put him on the payroll and the idea was he was supposed to notify us where the guerrilla activity was, and I don't know whether he was very effective. We'd go back into Bogota and tell him where we were, and he said, "Oh yes, I knew where you were, and I'm following you all the time." I

don't think he really helped us. I guess it gave us a little bit of feeling of security; he did help us in a couple of cases we had with the government in some paperwork, but I don't think he helped us particularly with the guerrillas.

Fuerstenau: How long were you and Charlie in Colombia?

Livermore: About two years. Geologically, there was lots of mineralization around, but mostly all small properties. If we had gotten into something really interesting we might have tried to stick it out a little longer.

Fuerstenau: Is there any significant gold production in Colombia these days?

Livermore: There are only these mom-and-pop operations; I forget what their production of ounces is. It's fairly substantial, but there's only one major mine operating, and that's an old mine called Frontino which was actually mined by the British many, many years ago. Most of these mines didn't go to any depth. They were the type of deposit that petered out at shallow depth. This one went on down and they were mining down--way down, two thousand feet with a good strong vein. But that was really the only operation there. There are a couple of little operations, Canadian companies trying to operate down there, but they've had problems. One of their geologists was actually killed, and then there are some dredging areas. Of course, that used to be a big dredging country. The Pato River had enormous dredges, and they have a couple of dredges operating, but one of them got blown up while we were down there by the guerrillas, so that didn't seem very attractive.

I think most companies are very leery of working in Colombia right now. There is a company called Conquistador that's supposed to be trying to do some work down there. You read about how they keep blowing up all the oil pipelines all the time. What you really have to do, of course, the only way you can deal with them is to pay them off. In certain areas, you just have to buy them off. They really actually control some of the rural areas, and they are the government; the government has no control in a lot of these back areas, which is where we were working.

In Colombia, you have to distinguish between the mountain guerrillas, which we had brushes with, and the drug people, who are operating really quite separately, although some people said some of the drug people were subsidizing the guerrillas.

The guerrillas were a political group; most of them were Maoists and they were interested in simply overthrowing the government. The government was always trying to control them, and what they wanted to do was to try to get them to lay down their arms and join the political process. One group did, actually. They decided to form a political party and they ran for office, and about eleven or twelve of them were elected to their local congress--of course, obviously, they were a very left-wing group. They met for one congressional session but during the next six-month period, all eleven of the members were assassinated. They were wiped out. No one knows who did it, but it was obviously right-wing people, ex-army people or something like that. They weren't going to tolerate any left-wingers, so that was the end of that political party.

## In Honduras, an Underground Gold Mine with Sulfide Ore

Fuerstenau: You're presently involved with a small operation in Honduras. Tell us about the property and how you became involved with this operation.

Livermore: We had a submission, originally, to Rayrock, the company that I was involved in, with this property in Honduras, and I went down and looked at it, and it didn't seem to be of a sufficiently large size to interest Rayrock, so at the time I didn't recommend it to Rayrock. But I got thinking about it later, and I decided that I might want to take on the property myself. It was owned by a fellow named Bruce Wallis who had been working in Honduras for quite a while, quite a number of years, and was very well-acquainted down there and spoke Spanish fluently. It seemed like an opportunity that might be worth pursuing. I wouldn't have gone into anything if it hadn't been for Wallis, because to go into one of these Latin countries without any connections and not knowing people or who to trust or not to trust is really pretty dangerous; but he had the connections down there.

I thought that the property had some geological merit, so I decided to invest some money into a drilling program and to earn an interest in the property, and we were fortunate. It had been a very small mine, and had some very small reserves, but we were lucky in this drilling program to enlarge reserves, very substantially. So then the question became: what are we going to do with it? We weren't interested in carrying it to the next stage, so we then started looking for

someone to put the property into production. It was not a large deposit, it was more of a vein deposit, and most of the large companies wouldn't have been interested in it anyway.

We actually shopped it around for a number of years, and only recently have gotten somebody interested in putting a small mill there; 250 or 300 ton cyanide mill and then we hope now to get this property into production. While we were down there, we also did some exploration in other areas, and had a few run-ins even down there with some mountain guerrillas--not guerrillas, but just sort of bandits really. Nothing serious, but it's something you have to always be aware of in those countries.

Fuerstenau: This would be an underground operation of sulfide ore, is that right?

Livermore: There's some open-pit ore, but mainly underground. It's a pretty strong vein, and we hope it will carry to considerable depth. We have some deep drill holes--pretty high-grade drill holes--so we're hoping that the reserves will be extended at depth.

Fuerstenau: What are your reserves estimated to be?

Livermore: We have about a hundred thousand ounces of gold, which is of course pretty modest by modern standards. There's also a second property that we think they can join with this property to provide ore for this mill. There's probably another hundred thousand ounces at this other property which is about thirty miles away, so the two can be combined.

Fuerstenau: Building a mill for an operation of that size is pretty expensive. Are there any used pieces of equipment around? Used mills that you might be able to use?

Livermore: We're very lucky; the fellow that's interested in this property is a metallurgist, used to be the mill superintendent at the Pinson Mine, and he got interested in it, and he was doing consulting work at a property in Nicaragua, which is right next door. He made a fantastic deal with this company: they were replacing this old mill with a new, brand new larger mill and they had the old mill they wanted to dispose of, and he made a deal to get this new mill, mainly for his own consulting services. So he actually acquired this mill at a real bargain and the plan is to move this mill up to our property in Honduras, which isn't that far away. It's only about a hundred miles away, and I think it can be hauled up

there by truck. So that's been giving this property a big boost because we can get a mill on the property with very little cost.

Fuerstenau: Any idea on when this operation might be on stream?

Livermore: Probably towards the end of this year, which is 1997. We're hoping we might be in production by then.

## Looking for Carlin-type Deposits in China

Fuerstenau: You made mine examinations for lateritic nickel in Venezuela, and for gold in China. Where is the deposit in China? Is it a Carlin-type deposit? How about the size of the operation?

Livermore: Indirectly, through a friend of a friend, I heard of a Chinese geophysicist from Columbia University who had been doing some work in China, and he talked to me about a possible visit to China to look at some properties in southern China. Having worked so much in Carlin deposits, I had always been intrigued about other Carlin-type deposits in the world. Actually, one peculiar thing about the Carlin deposits is that they only really exist in Nevada. There was some talk about them in Russia, and various other countries, but one of the places they do talk about Carlin deposits is in China.

So I was intrigued to be able to go over there and look at these deposits and see if I thought they really were bona fide Carlin deposits, and I had a good opportunity with this Dr. John Kuo, who was born in China, and spent most of his professional life in Columbia University at the Lamont Observatory, so he had the contacts. I did go over with him and we connected with the Chinese government there and had several visits to Carlin deposits in southern China in the Guanxsi Province.

In looking at these deposits, they had certain similarities, but there was nothing that appeared to have the extent of the disseminations that we have here in Nevada: the enormous deposits, where they are milling hundreds of millions of tons. The deposits were more narrow, structurally controlled. So I would say they had some similarities, but I wouldn't say they were really a classic Carlin deposit because the mineralization didn't spread out in great widths as we see here in Nevada. They're more confined to structures.

## Milling on a Small Scale

Livermore: At one of the properties--we did look at the mill there, and I was kind of interested in the milling operation, and they had quite a large establishment there. This is an open-pit operation and they had big trucks and they built a dormitory for workers, and they had quite a fancy mill there which looked to me like it was almost the size of our Pinson mill and certainly capable of quite a large tonnage.

So I asked him what they thought they were going to put through this mill. I thought it was capable of several hundred tons a day surely, and they said, "We expect to operate at a rate of about a hundred tons a day," which kind of amazed me because--thinking back, they're not interested in profit as we know it. What they want to do is keep people employed so at the rate of a hundred tons a day, they probably could operate there for fifty years. [laughter]

Fuerstenau: [laughter] Theirs is also a socio-economic problem.

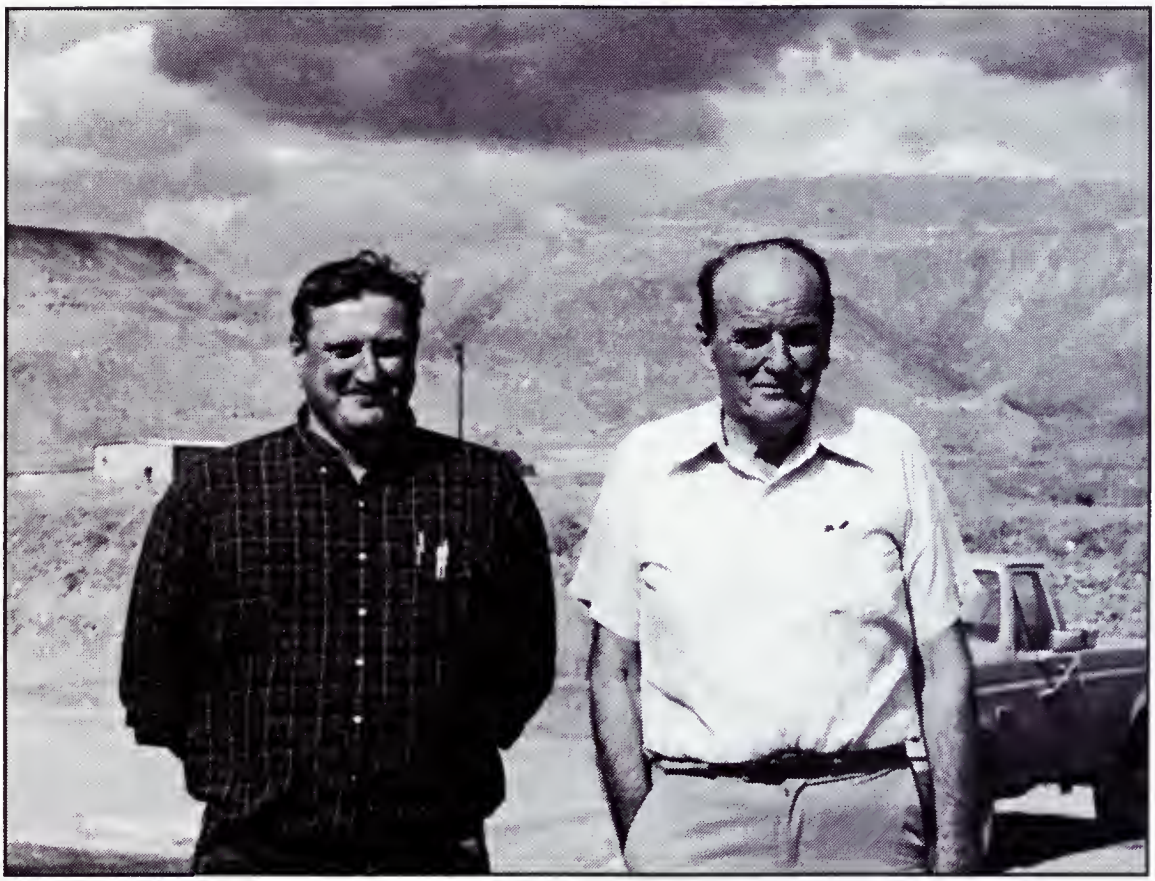
John Livermore, Alaska, 1938.

Lt. John Livermore and Lt. Cdr. Norman B. Livermore, Jr., USNR, Samar, Philippine Islands, 1944.

John Livermore on trail to Rio Conde, Colombia, 1986.

Dee Gold Mining Company partners, 1988: Henry Brehaut, Vice President, Placer Dome; David Crombie, President, Rayrock Yellowknife Resources; John Livermore, Manager, Cordex Exploration Company; Edward Thompson, President, Lacana Mining Corporation.

John Livermore, 1991.



David Cook and John Livermore at the Dee Mine, Nevada, 1992.

Tony Cerar and John Livermore, November, 1997, at the Corona Mine, Napa County, California. In background: Scott furnace constructed from sawed volcanic tuff blocks, circa 1900.

## X PUBLIC SERVICE ACTIVITIES

### Public Resource Associates and Mining Law Reform

Fuerstenau: I would like to turn to your public service contributions next. You formed the Public Resource Associates in 1985 with your brother [Putnam]. What was the background behind the formation of this organization?

Livermore: My brother and I really got started on--dealing with the 1872 Mining Law. The question was coming up at that time about revising the 1872 Mining Law. I had always been interested in revision and I had thought for a long time that the law is an anachronism; it doesn't apply to modern exploration methods and it's a very cumbersome law in a lot of ways, although it does have a lot of advantages as far as the industry is concerned. The way the law is written, the industry can operate on the public land without a great deal of control.

We thought we could maybe help on this process, and our idea was to get some of the industry people and some of the environmental people together and see if some kind of consensus legislation could be developed. The industry position was, of course, that they were only looking at very minor modifications of the law, and I had the feeling--still do--that the law should be changed in a more major sense, and that was sort of my objective. We had quite a few meetings. We had what we called a dialogue group, and we had five or six representatives of industry and four or five representatives of the environmental community who were more the moderate environmentalists; we didn't invite some of the more radical groups like the Sierra Club, which at that time was interested in a leasing system, which of course was anathema to the industry. The Wilderness Society was also interested in that, so we didn't invite them, but we had the National Wildlife Federation, which is the biggest environmental organization in

the United States, and the Audubon Society, and the Natural Resources Defense Council. We had some representatives there, I think, that were really interested in trying to solve the problem. They're not such pure ideologues.

We had a number of meetings, and we really came to agreement on quite a few things. One of our problems was that the representatives of the industry were not speaking for their top executives there. They were there as individuals. That, of course, hindered the process. We never could get the top industry people to go along with this process. Their feeling was that they should not give away their negotiating hand; they should try to give only very minor--accept only very minor changes in the law. So that was one of the problems. Anyway, we had a number of meetings, and one of the big problems that we didn't really get a consensus on, which was the toughest of all, is the land use planning and surface management, which is a very sensitive issue. The industry people want as little surface management as possible, and the environmentalists wanted a lot more government control over the land. We never did quite resolve that. Finally we realized that this principle was not acceptable to the industry, and they thought that they were dealing from a lot of strength and that they would probably only have to give up very minor changes in the law, so they took over the negotiating process, and our effort sort of withered away.

Fuerstenau: What's your prognosis for any change in the mining law? It doesn't seem like this is an issue that's going to go away.

Livermore: Well, I still think that the industry is not going to be successful. The industry's position is that they don't want to change any part of the mining law. Some of the things like the claim-staking procedures, and extra-lateral rights--everybody agrees are ridiculous; that we should get rid of those. The industry position is that by accepting changes in those provisions it would open up a Pandora's box to a lot of more major changes. Well, that's one way of looking at it. I look at it more from the point of view of public policy that I think some of those changes should be made, but it's really getting down to just tough negotiations and what industry will have to give up. I think they still think that they will get away with minor changes in the law, which I don't think is going to happen.

Fuerstenau: An item of interest: your brother [Norman] is, or has been a director of the Audubon Society, is that right?

Livermore: That's right, and another brother [Putnam] is actually a lawyer, and did a lot of legal work for the Audubon Society, so my family has strong ties to the environmental community, and that's one reason I think we were able to put this thing together and get these environmental people to engage in this dialogue. I still think that the industry would be wise to try and work something out with the environmental people and try to develop consensus legislation. But so far they don't appear to want to do that. As part of this mining law effort, we had for a while an office in Washington, D.C.

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Livermore: There's still a certain amount of input, I think, we could have in the process. Anyway, when that kind of died down, we had the organization, and we set up an office here in Reno.

## Public Policy Issues in Nevada

Livermore: We decided to pursue other things--other public policy issues, and mainly concentrate just in Nevada. We had already been working on some of those issues, but I hired Susan Lynn, who had a good background in planning and had been involved in Congressman Santini's campaign, and was quite well known in the community, and we started work. Then we employed another woman who was later replaced by the present person we have, who is Desna Young, a former BLM employee.

We decided to work on Nevada issues, and Susan Lynn has been very interested in the Truckee River, improvement of the Truckee River and maintaining minimum flows in the river, which is a very important issue, I think. Desna has been interested in developing a trail system in the Truckee Meadows and improving access to public lands through private property. As Reno is growing and enlarging in area, access to the public land is becoming more and more difficult because the new subdivisions are closing off access. So she has been working on that.

## Walker Lake, a Crisis Situation

Livermore: One of our projects also has been to support an individual, Graham Chisolm, who is working on the Walker Lake problem and

trying to figure out ways to prevent the loss of the fishery in Walker Lake, which is really a crisis situation. We've had these recent wet winters, but if the level of the lake had been decreasing the way it was earlier, the experts say that the total fishery would have been destroyed in about two years. So we're trying to work with different groups, and do research on possible ways of getting more water into the lake --maybe more efficient ranching or some possibilities of pumping water. Plus various other issues, and solutions to the problem. We have also employed a hydrologist to calculate water balances in the Walker River Basin. Trying to help out in some small modest way to try to solve the problems.

Fuerstenau: Is there anything the federal government, or the state government might do to help this situation?

Livermore: Well, Senator Reid is very interested in this problem; and one of the problems as Senator Reid himself has said is that none of the other elected officials in Nevada think it's a good issue, and one of the things Graham Chisolm, who is very well-known here, having worked for the Nature Conservancy, is trying to do is develop more public interest in Walker Lake, and to point out to the governor and to our state legislature that this is an issue they should be looking at. It's a very critical environmental issue.

The federal government has been doing some general studies--the U.S. Geological Survey--but it's a tough political issue because--of course, probably the water has to come from the ranchers, either by more efficient use of the land or by purchasing water rights. A lot of the ranches are for sale. We are not interested in that part of it--but some group is talking about setting up a land trust, which will purchase land that is available and make water available. There's a big wildlife refuge which probably has extensive water rights--you could argue which is more important: the wildlife refuge or Walker Lake. There is some reason for saying that this wildlife refuge could dedicate water to the lake and not hurt their wildlife refuge.

There are a lot of different ways of approaching this thing, but it's a very complicated problem that's not going to be solved overnight.

Fuerstenau: It's good that you and other persons and agencies are looking at saving this really very wonderful resource down at Walker Lake.

Livermore: It's actually unique. That type of lake--there are only a few of them in the whole world. Unfortunately, there are no endangered species there; that would make it a lot easier.

## The Rural Alliance for Military Accountability

Fuerstenau: There is an organization called The Rural Alliance for Military Accountability. How long has this been in existence, and how did you get involved?

Livermore: I don't know the background of that organization; it's been going for several years. We got interested in only one phase of their work, and they have representatives all over the country. There's a Grace Potorti here in Reno who has been associated with them for some time, dealing with military matters. We have become interested in what she's doing, and we've helped to support her work. She is a very remarkable woman who is very knowledgeable about the military issues and she's been very concerned like a lot of people have, with the military establishment that is continuing seeking more land in Nevada and also more air space.

She appears at these hearings, and she's very effective. She gets information under the Freedom of Information Act. She has all the facts and figures when she goes to these hearings, and actually has been quite effective in slowing down--not only here in Nevada, but also in Idaho and other places--the constant demands of the military for more space, which I feel myself--and a lot of other people--I just can't understand why they are continually needing more and more land. They won't cooperate--for instance, you have the navy at Fallon--they won't cooperate with the air force at Nellis Base near Las Vegas. Nellis has this enormous area down there, but they have to have their own area. Of course, I'm not a technical expert. Anyway, I just have the feeling that some of these requests for land should be questioned, and she does that. It's pretty hard to stop the Department of Defense, but she slows them down. [laughter]

Fuerstenau: [laughter] I know that the navy is trying to get more space out at Fallon these days.

Livermore: One thing that has come up, and Grace has been on--she was just quoted in the newspaper and she's been on the radio--one of the things is that the national guard is giving up a very large air space to the north of us they don't want any more.

Of course, the navy immediately applies for it. They don't require any hearings or any environmental impact [study] because that's one agency to another; so she's raising the devil about that.

There should be, at least, some hearings because they say, "Here's a big space that's being given up, we'll just take it." Whether they really need it or not, I don't know. I'm sure that they, because of modern weaponry--they probably do need some of the space; I don't know. But I have the feeling that if it's there, they just take it.

## The Foundation for American Communications

Fuerstenau: The Foundation for American Communications was started by John Cox to educate journalists. I know that you co-sponsored two seminars on public land management; could you tell us about these seminars?

Livermore: Well, I've always thought, for one thing, that industry, particularly the mining industry, does a very poor job of presenting their case to the public. Industry comes up with some statement to the public, or news commentaries or advertisements, and immediately the public reaction is, it is self-serving; you can't believe anything industry says. That's a real serious problem industry has: how do you present your case? The mining industry has a very good case to present to the public. They get beaten down all the time by the media. Somebody says the way to get your message across is not from industry directly to the public; it's to get third parties involved. If you get the third parties saying that the mining industry is not doing a bad job on reclamation and various things, then the public hopefully will listen to that. They will not listen--I don't think--to industry. Sometimes they will, but I think industry makes a mistake.

This Jack Cox started this organization, which is to educate journalists, because the mining industry gets lambasted in the media, and usually the articles are very unfair. The problem is that the general public--if you write something negative about industry--that supports their natural feeling anyway, because most people think that the industry is all greedy people and they are irresponsible. So when an article comes out, maybe the facts are all wrong, but the public believes it. Anyway, the media loves to put out negative stuff about anything; it sells papers. So the whole

idea of this organization is to hopefully try to educate journalists about economics and how industry works, and show the other side of some of the environmental issues.

Hopefully, when they write their articles, they will be more balanced. What they do is line up some very outstanding professors, like economic professors from Harvard University and nationally known, and they put on seminars for journalists, and they get representatives from all the newspapers and sometimes, the radio--mostly written newspaper journalists. They're very well-received, and they're very popular, and many of these newspapers send representatives off to these meeting. They have them on all subjects, but what I was particularly interested in are some dealing with public land issues, and those are the ones that we have helped to support.

Fuerstenau: Where were these seminars held on the public land issues?

Livermore: One was held here at the Department of Journalism at the University of Nevada. Jim Gentry has been very interested in this process, and he has some other seminars. The last one was held in Denver. These are only two; I guess they've had several dozens of these meetings all around the country. I think it's unique, and kind of a new method of getting the message across. I know for instance the industry put out a video one time, and this was put out by Caterpillar tractor, and they hired an outfit back East who does videos for public television. The idea was that this group said, "Okay, we'll take this on, but it has to be a balanced production." So they had representatives of industry talking about certain mines and how they were doing reclamation, but then they had some environmental representatives too like Glenn Miller.

Well, when some of the industry executives saw that--"Oh no, we don't want that." Caterpillar was going to pay for this because they do a lot of business in mining. So they scratched it and did it all over again. What they did was, they came out with another video which was just saying: "Industry: what great guys we are, and we're doing this and doing that." That's an example, I think, of how <u>not</u> to do things, because who's going to watch that? You're never going to get that on public television. The only people who will watch that is at other mining conventions. Everybody is saying what a great video it is, but to me, that's not the way to do it. But I'm just one person. I'm kind of a maverick in this whole thing; that's not the way to get the message across.

I think this other video was very good, but some of these people were making valid criticisms. They were talking about bird kills--you have to face those issues. Mining has done very well with the bird kill issue; I think they've stopped it. But when these issues come up, you have got to face them and answer them. Say, "We know we have a problem with bird kills, and we're doing this and we've done this, and actually, that problem has sort of gone away." The cyanide problem--we know that's a problem, and this is how we're dealing with it. But to say, "Everything is just dandy; everything's perfect"--I don't think that's the way to do it.

Fuerstenau: I agree with you. The mining industry has never really done an effective job in their own PR.

Livermore: No, they haven't.

Fuerstenau: Were journalists countrywide invited to attend these?

Livermore: Oh, yes. All over the country. There tend to be more Western people because they're dealing with more Western issues, but they come from all over the country. Small newspapers, big newspapers; the New York Times, and little tiny newspapers in small Western towns. I think it's important of course, that this group is not considered to be subsidized by industry because that would defeat the whole purpose. Jack Cox has done that. He has support from the Ford Foundation and various foundations, and he has had some support from industry, but it's not an industry-backed thing. I think there is widespread support. For that reason, I think people will accept it as being a balanced program, not just something that industry has subsidized. I think he has done a good job on that.

Fuerstenau: You support the Nevada's Women's Fund; is that right?

Livermore: I do. I'm a supporter of women; of women's improving themselves. I'm very impressed with what women are accomplishing now. I'm particularly interested in encouraging women to enter the science and engineering fields and supporting scholarships for women in those fields. They're very capable of doing it; we know that.

## Mackay School of Mines, University of Nevada-Reno

### The Arthur Brant Chair of Geophysics

Fuerstenau: You've been very supportive of the Mackay School Mines with scholarships, research support, and funding the Arthur Brant Chair and the DeLaMare Library. Who is Arthur Brant, and why the chair in his honor?

Livermore: First of all, I think I've been very fortunate in spending a rewarding professional career in Nevada; it has not only been rewarding professionally, but also financially for me. So I feel that it's only proper of me to return something to Nevada; to put something back into Nevada because it has been so important to me in my career. One of the things that I've been interested in is the Mackay School of Mines in general.

The chair in geophysics came up actually a few years ago. It was proposed by Jim Taranik and it appealed to me as a niche that I think could be developed in the Mackay School of Mines. The school is strong in seismology, but in exploration geophysics, it doesn't have too much of a department. Mining geophysics has been neglected, and is being neglected now in a number of universities: UC Berkeley, the University of Arizona, and the University of Utah. My feeling in this--and Jim Taranik felt the same way--that this is a chance to develop a center of excellence in geophysics here in the Mackay School of Mines, filling a niche that maybe doesn't exist in some of the Western universities. In doing that, the question is: what do you call the chair?

Well, the man that I worked with at Newmont for many years, Arthur Brant, was an absolutely remarkable man and one of the leaders in mining geophysics since the war [World War II] and was mainly responsible for developing the induced polarization technique and advanced forms of electromagnetic exploration; just a very remarkable man. He seemed to me a logical person to be memorialized by this chair.

Fuerstenau: I remember when you and he both came to campus when the Arthur Brant chair came into existence. Is he still alive?

Livermore: Still alive, yes. He's about eighty-five years old.

Fuerstenau: Is he still active?

Livermore: He has bad arthritis, but he's mentally still very active. He's looking forward to the dedication this fall of the chair, and he has given some money to the library for the room named for his wife, the Lilli Brant Room. He is certainly interested in that. He has become interested in the university.

## The DeLaMare Library and Whit DeLaMare

Fuerstenau: Tell us about Whit DeLaMare, and your interest in seeing him honored by the naming of the library, the DeLaMare Library.

Livermore: Whit DeLaMare was a very remarkable man. He was a graduate mining engineer, and he worked in various operating jobs for some of the large mining companies and he had his own iron mining company in the Jackson Mountains. I got to know him when I came back to Nevada in 1970. At that time, he was kind of at loose ends. The iron mine was shut down and he was living in Winnemucca, and he found that he didn't want to leave Winnemucca to take another operating job, and he found he was kind of interested in geology, and he was studying maps and doing a little bit of prospecting. Pete Galli and I got talking to him, and asked him if he wanted to join our organization, which was Cordilleran Explorations. This helped him because the cost of analyzing samples gets kind of onerous for an individual, so we offered him a salary plus a bonus for anything he discovered.

He, at that time, was over sixty years old, and he decided that what he really wanted to do was just prospect; just climb the hills of Nevada. Having had an engineering background, and studying geology, and he was a curious person --he read all the reports and he developed ideas looking at aerial photographs--he soon learned the things to look for, particularly for Carlin-type deposits, although he wasn't always only looking for that. So we just turned him loose, and made a few suggestions of where to prospect, but a lot of it he did on his own. He'd bring in these samples--my job, though I did quite a bit of prospecting myself actually, was often to follow up what he'd found, and then decide whether we wanted to pursue in a more serious effort. He just did the initial work.

Once he collected some samples then he would go on to somewhere else, and we would have to decide if we wanted to do a thorough geological evaluation. A lot of things he brought

in we decided weren't of interest--he was awfully good at finding high grade, but sometimes it would be a vein only an inch wide or something. Anyway, he came up with a lot of very good discoveries--either direct discoveries, or rediscovering places. The Preble, of course, was a new discovery; an area that he selected. He liked the looks of the area, and did some sampling. On the basis of just one sample--it was obvious to me that this was a Carlin occurrence, and we had to follow up on it, and we did, and it developed into the Preble deposit.

The Dee was a similar situation where he found a sample that he liked the look of in an area that a lot of other people--geologists and prospectors--had tramped all over. But he spotted this area. Again, just on the basis of one sample, I was convinced that this deposit really deserved a lot of work. We did follow up on it, and it turned out to be the Dee ore body.

I've always given great importance to the prospector because he's the one that goes on the ground first. It requires good work to follow up on, good geological work, and a good evaluation, but if you don't have the first guy on the ground, you're never going to find anything; he's the one that leads you to the spot in the first place. I don't think a lot of people give the prospector as much credit as he deserves. In large companies, others often want to share the credit. He's the first guy on the ground, and Whit was very good at that.

Fuerstenau: How many years did Whit work for you then?

Livermore: Twelve years. He unfortunately got cancer, and he died from that.

Dee was a graduate of the Mackay School of Mines, and he did a lot for the state in these discoveries he made, so I thought it was very proper to have him be memorialized in the library, and the university agreed.

Fuerstenau: Now the library is going to be funded from royalties from the property out by Valmy as I understand?

Livermore: Yes.

Fuerstenau: How is that going to work?

Livermore: Well, the university--it was twenty years ago or more--somebody--we never did quite run that down, I did a lot of

research on that--but some person who bought a railroad section of land decided for some reason to give it to the university. So the university had this plot of land, and a few people had looked at it, but nobody thought there was any obvious mineral potential there; it was just real estate. But Cordex, headed by Andy Wallace, who took over my job of running it--got interested in this area close by, a couple of miles to the north of the university land.

On the basis of good geology, he did some drilling, and found a pretty interesting ore body. Then, in expanding his operations, he eventually got working down toward the university property, and by some drilling, he found some quite large reserves on this property. The university was having trouble finishing the library. We had raised more than half a million dollars, and they got some money from Keck, but they still needed another couple of million dollars. It seemed to me that here was the chance to get this library done.

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Livermore: I proposed to the administration that maybe this royalty should go to the Mackay School of Mines and be used to finish off the library. President Joe Crowley did agree to that. So now the money is being used for that purpose, and the library is in the process of finally being completed after quite of a number of years.

Fuerstenau: When is the scheduled dedication for it?

Livermore: It's in October.

Fuerstenau: Very good.

Livermore: But the library will be finished long before that, in May. They wanted to have the dedication at the same time as the Homecoming in October.

# XI DEVELOPING THE RESOURCES AT MONTESOL

## Volcanic Terrain Favorable for Water Storage

Fuerstenau: I realize that Montesol, your ranch, has been discussed in the previous portion of the interview and that your brother [George] is going to provide quite some detail with regard to the history of the ranch, but I think it would be important also for you to talk about the geology of the water resource that is presently in production and being marketed.

Livermore: Well, when my grandfather and father put the property together over the years, we knew we had some wonderful water up there. We've always been very proud of our springs. We have over thirty springs on the property, but we never really thought of commercializing it until my brother Put and his wife Pari got involved. The geology is a volcanic terrain--we are adjacent to Mount St. Helena, which is a large volcanic pile. Those rocks tend to be quite favorable for water storage because they tend to be porous, and they're actually tuff, volcanic ash deposits, deposited in layers, and they tend to hold the water. The rocks underneath the volcanics are very impervious. Other parts of the surrounding area where you get into the basement rocks are very unfavorable, so we just happened to have very favorable rocks for water storage.

We have the headwaters of the Putah Creek drainage; we control the headwaters of this drainage. There's no one above us. So really from the point of view of water purity, we have another interesting additional factor as far as the possibility of water pollution. The other thing we have is a very interesting feature right at the main ranch, which is a very large landslide which has produced a lot of springs; springs which come out of the base of some of these slides. We found, in drilling bore holes close to our springs--we drill down through this landslide, and at the contact between the landslide and these impervious base rocks, we get good

water production in these bore-holes. That's where we're getting our water.

Some of this landslide material has quite large openings and big boulders and we are able to get some pretty productive bore holes. The problem we have had is not a problem of quantity, it's a problem of quality, because in the same volcanic terrain, you get alteration of this ash to a very fine colloidal clay called bentonite. That appears in the water; you don't really notice it. You look at the water and it's absolutely crystal clear, but you have got a tiny, tiny amount of this colloidal clay which won't meet the standards of water quality. In a couple of our bore holes we haven't had this problem, but in one of our best holes, unfortunately, we have this problem.

The solution appears to be now that we may have to filter this water to bring it down to the standards that are required. So that's been a problem we've had to overcome, and it looks like maybe we have it overcome now. Aside from that, the water is very pure water because we're in an area of very high rainfall and that water is a very local source; it doesn't move very far through the rocks. We have about seventy or eighty parts per million of total dissolved solids, which is enough to give it a taste--everybody says that the water tastes very good, and yet it's really very pure as far as minerals are concerned. It looks like we have a pretty good asset there--a commercial asset that we never thought we had before.

Fuerstenau: How deep are the bore holes?

Livermore: They're very shallow, and they are drilled adjacent to springs so the water can be classified as spring water. This landslide only runs about seventy-five or a hundred feet thick, so a lot of these holes are getting water at forty feet. They're very shallow.

Fuerstenau: Naturally flowing, or do you have to pump?

Livermore: We have to pump. We don't have any artesians, although the water that does come up is somewhat artesian when it comes up to ten feet or so, but it doesn't come up to surface. It is good water. Of course, we're prejudiced I guess, but I think everybody does say that it is very good tasting water.

Fuerstenau: As a matter of fact, since I learned that Calistoga water is your water, we now buy Calistoga water. [laughter] How big is the ranch?

Livermore: It's about seven thousand acres total.

## Other Ranch Activities

Fuerstenau: Do you run any cattle on the ranch?

Livermore: My brother [Robert] used to. It's not suited for cattle. A lot of it is actually timber, but we do have some grassy areas, but it's very steep, and it's not really suitable for cattle. He did it as more of a hobby than anything else. We don't run any cattle there. We do logging. We have some good forest. In fact, the original forest, which is all logged off, was beautiful Sugar Pine--enormous trees--plus Ponderosa Pine, and Douglas Fir. We're in an area of very high rainfall because of Mt. St. Helena; it sort of intersects the clouds and then dumps all the water. The trees grow well there.

Fuerstenau: Do you still have a logging operation in effect?

Livermore: Yes, we do. We log; not all the time, but we do selective logging. We don't do it every year; maybe every four or five years we do some logging. We're doing a lot of reforestation. We've planted more than about fifty thousand seedlings over the last few years in trying to improve the forest. There are certain areas that have been burned over, and we're trying to restore the forest in those burned-over areas. We also have a lot of hard wood. There is a lot of oak; we do harvest some of that for cordwood.

Fuerstenau: Do all of the family have dwellings on the ranch then? I know you do.

Livermore: Yes, we do. We have five different dwellings. Each brother has a house. Then we have another house which we bought from a family that used to be our neighbors, and that's used as sort of a joint house; different members of the family use it on a reservation basis.

## The Oat Hill Mine

[Interview 5: April 12, 1997] ##

Swent: Maurie Fuerstenau interviewed you in January, and now we are meeting in Piedmont to pick up a few loose ends that we've left from previous interviews and maybe cover some new ground as well. Where would you like to start, John?

Livermore: With the ranch.

Swent: All right, let's go back to the ranch and the environs there. Let's begin with Oat Hill or Corona? Which would you like to start with?

Livermore: Did I cover the Oat Hill before?

Swent: No, you didn't talk about the Oat Hill at all.

Livermore: Well, I guess the Oat Hill mine, which was the third-largest producer of mercury in California and was quite a substantial operation from about 1875 up to 1910--there were several hundred people working there at one time--was abandoned during the Depression, and the property came up for sale. My father purchased it at a very reasonable price.

Swent: When was that?

Livermore: That was about 1925, I think. Then when the war came along, the price of mercury increased, and there was a group--the H.W. Gould Company--that became interested in the property and actually leased the ground and operated it for several years while the price remained up. They installed a large rotary kiln there, and it was quite an operation.

Then after the war, they shut down and nothing happened there for quite a while. But then again in the late fifties and early sixties, the price of mercury came up again and there were various people interested in the property--including Newmont Mining Corporation. We had a small operation developed there by a person by the name of Bill Kritikos, who had a small kind of mom-and-pop operation with a gravity plant there. He produced for a few years, and it was a pretty marginal operation. Then the price dropped again, and nothing has been done on the property since then.

Swent: Was the geology unusual there?

Livermore: It was. It was a different type of deposit from most mercury deposits in California, which are usually associated with serpentine. This deposit was several miles from the nearest serpentine, and it was a sandstone deposit. It was quite high grade. The values in some cases disseminated out into the wall rocks, which was somewhat unusual for mercury. So this was kind of a unique deposit in the state.

With the environmental problems of mercury, it's probably very unlikely that this mine or any mercury mine in the United States would ever be reopened again.

Swent: So you're not planning to start it up?

Livermore: No.

Swent: There was somebody named Ansel who had it for--wasn't it Ansel that operated it? Was that after your family bought it?

Livermore: We had several very short-term--they had several people lease the property. Monsanto had been there one time. Several people did exploration work during the fifties and sixties, but they never did go ahead with anything. The closest to an operation was actually Newmont, and they drilled out a low-grade ore body--over a million tons. They were ready to put the property in production, but they were trying to get a guaranteed price from Mallory, who was one of the big consumers of mercury. But they couldn't get that guarantee, so they decided not to go ahead with it. Then the price dropped.

Swent: Was that when you were with Newmont?

Livermore: Yes. So that was the end of that.

## The Corona Mine

Livermore: The Corona mine, which was an adjoining mine, was a more traditional mine on the serpentine contact, and which I acquired myself later. It had an interesting operation in the sixties under a person named Hugh Ingle[1] and his son. They put in a little plant there, a small rotary kiln and condenser plant. It did pretty well in the sixties for a while, until the price dropped again. The property adjoins the main ranch, and I'm interested in trying to solve some environmental problems there, reclaim some of the old dumps.

Swent: How will you do that?

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[1]See Hugh C. Ingle, Jr., interview in process, 1998, in the McLaughlin Mine/Knoxville district oral history project, Regional Oral History Office, The Bancroft Library, University of California, Berkeley.

Livermore: Well, by trying to terrace the dumps and trying to revegetate them. There's also an acid mine drainage problem at one of the old tunnels. We would try to plug that tunnel, and see if we can stop that acid mine drainage.

Swent: Would that be similar to what they've done at the Reed Mine?

Livermore: Yes.

Swent: What's wrong with acid drainage? What damage does it do?

Livermore: It ruins the fishing in the creek, of course, and it stains all the rocks. So visually it's very unattractive because the creek below the mine--all the rocks are all stained with iron oxide. There are a few fish, but it doesn't support much fishing there. The people downstream, and the state in general, is unhappy about the situation; they'd like to see it cleaned up.

Swent: What is the stream?

Livermore: James Creek.

Swent: But this is not a recent affair.

Livermore: Oh, no--it's been there seventy-five years.

Swent: You mentioned that there are people who call you up or write to you. You were telling about getting a letter from somebody who--

Livermore: Yes. There's a lawyer that's trying to cause some trouble on this. He apparently goes around and looks at records in Sacramento of what mines have this acid drainage problem. There are plenty of them in California. It's really kind of a shakedown. He says he's going to start litigation, and what he's hoping to get, I think, is some kind of a settlement where he'll be bought off.

Swent: This is the sort of scam that develops in situations like this, isn't it?

Livermore: We were going to try the solve the problem ourselves, because I think it's something that I think we can do with a very minimal cost.

Swent: And what's your motivation for that?

Livermore: It's kind of an experiment to see how it can be done, how we can get the thing revegetated and eliminate the erosion problems. It's kind of a--you might call it kind of a research project.

Swent: I'm just wondering what makes you do it.

Livermore: I'm interested in mine reclamation. I've been involved in the reclamation of several mines in Nevada. It's a serious problem that the industry has to face. We're doing a better job at it than we did initially, but I think it's the responsibility for all of us that have been in mining to try to figure out better ways to reclaim these old mines.

Swent: You think you'll learn something from this that you'll apply?

Livermore: I think so.

Swent: You'll apply it some other place then?

Livermore: Yes.

## Geothermal Resources

Swent: Well, that's a good motivation.

Livermore: The other thing I might mention was the geothermal interest up there at the ranch. We're located only five miles south of the main geothermal field, which is the largest in the United States and one of the largest in the world.

Swent: Is that the Geysers?

Livermore: The Geysers, yes. We're theoretically on the continuation of that zone. As I say, we're only five miles away. We had quite a bit of interest at one time with Amax. They did a lot of drilling on our property, looking for similar reservoirs of steam. They drilled a lot of holes 2,000 feet deep, and one production well over 7,000 feet deep. But the temperature was not quite good enough, and I think there's less interest in geothermal exploration now in that area because the pressures in the Geysers field itself are declining. I don't think there's the same interest in geothermal exploration that there used to be. For a while there was a lot of activity around there.

## More About Marketing the Spring Water

Swent: I think it turned out not to be as economic as they thought, didn't it?

Livermore: Yes. The other thing that we have is the water situation at the ranch. We've always been very proud of our springs and very good quality water and good tasting water. My brother [Putnam], who is a lawyer in San Francisco, was successful in working out a deal with the Calistoga Mineral Water Company to purchase our spring water. So we're now in the water business. We're only ten miles from the Calistoga plant, so we fill up these tank trucks with water and haul them ten miles to the Calistoga plant. That was kind of an interesting new development.

Swent: Yes, you had discussed this briefly with Maury Fuerstenau, but I didn't know if you wanted to say any more about it.

Livermore: Oh, I did get into it.

Swent: A little bit, but you did not go into the issue of particulates in the water.

Livermore: Yes, we had some permitting problems, and we had problems with downstream users. Of course, this water is actually coming from boreholes close to a spring. Under the state and federal regulations, that can be classified as spring water if the water is close to a spring and of the same quality and same aquifer. So we're not taking any surface water, but we've had trouble with some of the downstream users who are taking surface water from shallow wells and have not a very good water source--for a while there, they were claiming that we were taking water that they had been using downstream. But I think we have pretty well proven to them that the underground water that we're taking has no effect on their surface water.

Swent: It's a whole new way of looking at water now, isn't it? It may be more valuable than gold in a few decades.

Livermore: Also it sells more than gasoline, which is hard to understand [laughter].

Swent: Somebody has built quite a plant there, I see.

Livermore: This is the loading station, where they load the tank trucks up.

Swent: That's a whole new industrial development.

Livermore: That's quite a fancy layout.

Swent: Did Calistoga put that in?

Livermore: Yes.

Swent: New signs on the highway and everything.

Livermore: Yes, it's quite an installation.

Swent: So you've gotten interested in water as a resource.

Livermore: Yes, and it's something of course that we never thought would ever be commercialized. So that's a little bit of luck [laughter].

Swent: Do they give you free bottles of bubbly water?

Livermore: Yes.

Swent: Yours isn't bubbly, though.

Livermore: No, this is spring water. It's very pure spring water. Our water runs about sixty parts per million total dissolved solids, and the Calistoga mineral water runs 500 parts per million. That comes from wells in the valley. So there's quite a difference.

Swent: Do you want to tie in your groundwater tour with that? You've been getting interested in groundwater, haven't you?

Livermore: That could become a public resource, and of course I am interested in groundwater in Nevada; that's another subject.

Swent: I think you just took a tour of California groundwater, didn't you?

Livermore: Right, yes.

Swent: So that's a new interest of yours.

Livermore: Right.

Swent: A very important one.

Livermore: So I guess that covers the ranch pretty well.

## Tours to Kazakhstan, Uzbekistan, and South Africa

Swent: You felt that you talked about lateritic nickel already. I wasn't sure that you had. And then now a couple of these trips, and you were a little reluctant to discuss them, because you were there more or less as a tourist--I think it's worth telling that you've had a couple of interesting trips within the last few years. One was to Russia. This was a People-To-People group, was it?

Livermore: A People-To-People trip, yes.

Swent: Everybody on the trip was a geologist?

Livermore: They were engineers and geologists. We visited several mines in Kazakhstan and Uzbekistan. The highlight of the trip was to visit one of the largest gold mines in the world, the Murentau mine, which is a very impressive operation. It's one of the jewels of Russian mining. A lot of Russian mining has been neglected, particularly with all the financial problems, but this mine is very profitable. It's a beautiful plant and very well run. It's quite an impressive operation.

Newmont has a deal now, where they're treating the so-called waste dumps in this mine that have piled up over many years. There is still a lot of gold in what they considered waste dumps. They're processing these waste dumps by a different method--by the heap leaching method--and recovering a lot more gold out of these dumps. It's quite a profitable operation. So that was something that was interesting to see.

Swent: I think you were also impressed with one of the mills, you had mentioned.

Livermore: It was an enormous mill. The one building, the mill, was one kilometer long [chuckle]. I don't think there's any mill in North America that long. It is typical of the Russians; everything they do is in a big way. The number of people they have working there is several times what we would have. They have an enormous number of professional people that we would never consider affordable. A lot of them are doing work that we would consider proper for technicians. And then they built this enormous infrastructure way out in the middle of the desert, a large town of 50,000 people with high-rise apartments. Of course, the mines in Russia have to provide everything: they have to provide the schools and the hospitals, which mainly are serving this mine, plus a couple of other

smaller mines in the area. They had to build a 200-mile pipeline for water. It was a very, very impressive operation.

They look at things differently. The capital cost is something they don't look at. They look at the operating cost, and the cost of infrastructure--which we have to figure in our economic calculations; they don't figure that in so much. This mine is very profitable, but I don't think there's any way it will ever pay off the total infrastructure [laughs] that was built.

Swent: When were you there?

Livermore: That was in 1994.

Swent: So that was after the collapse of the USSR.

Livermore: Yes. This was when Uzbekistan was independent.

Swent: But it was still a socialist kind of structure.

Livermore: Well, some of those countries still have very strong central governments, and the head of Uzbekistan is still almost a dictator. He was the former head under communism, so he stayed on as president. So it's a very strong centralized government --not a democracy by any means.

Swent: So they don't have to do careful cost accounting.

Livermore: No.

Swent: Then your African trip was more recent.

Livermore: Yes, Newmont, my former employer, had several mines in South Africa which I had heard about for a number of years and always thought that I would sometime be sent down there by the company to work on some of these mines. But I was occupied with other projects. I thought it would be kind of interesting to go down and see these mines that I had heard about, and at the same time to travel around the country and get an idea of the politics after the changeover in government and also do some game viewing. I traveled around quite a bit, and I got all the way up to Namibia and almost up to the Angola border, which is where one of the Newmont mines--called Tsumeb--was.

I had always heard that South Africa was a beautiful country, and it is--particularly around Cape Town. It's some of the most beautiful country in the world, really.

Swent: You got to Palabora too, didn't you?

Livermore: Went to Palabora, and I visited a platinum mine, and I visited a diamond mine, and I visited a couple of gold mines. I covered quite a bit of ground.

Swent: What was your impression of their mining?

Livermore: Oh, very modern. They have top-notch people, very fine professional people. They're right up to our standards--in fact, they've been in the vanguard of mining research. Very strong research. In fact, some of the new techniques that we've been using in the United States were developed in South Africa.

Swent: Which ones?

Livermore: Like the carbon-in-pulp process, and some more technical parts of the process that we used at the Pinson mine. They've developed some geophysical methods and a lot of different metallurgical methods of treating gold and uranium ores.

Swent: You're using something at the Pinson that was developed in South Africa?

Livermore: Yes. The carbon-in-pulp process that is the main process used in this country was really developed in South Africa. Homestake had tried it in part of their plant, but Pinson was the first full-fledged operation in the United States.

Swent: So you were glad to see it.

Livermore: Yes. I think I did discuss the China trip, didn't I?

Swent: You talked to Fuerstenau about that, a little bit.

Let's do San Luis first and then come back to Nevada, shall we?

Livermore: Okay.

## The San Luis Mine, Mexico

Swent: You haven't mentioned San Luis at all. You were a director there for a few years.

Livermore: Yes, I was invited to be a director at San Luis, which was a very famous silver mine in Mexico.[1] I enjoyed making several trips down there near Mazatlán. This mine was one of the great silver mines of the world, actually--very high grade.

Swent: When were you there, John?

Livermore: Oh, I don't know. I'd have to look it up. It was almost twenty years ago.

I was very interested in the geology. It was one of the classic examples of epithermal deposits, so it was interesting to get a chance to learn more about that in detail.

Swent: Your friends, the Rawlings, had a long connection there.

Livermore: That's right, going back to Colonel Rawlings, of course, who really was the one that discovered it for the Hearst interests.

Swent: Were you a director when it was Mexicanized?

Livermore: Yes, it was Mexicanized before I became director. We decided that the mine had seen its better days, actually, particularly the main property--it looked like the ore was weakening at depth, and the price of silver was very high in 1980. So we decided to sell the company, and so that was the end of San Luis. It was taken over by a Mexican company. That was in 1980.

Swent: Was that a decision or was it forced on you?

Livermore: No, it wasn't forced on us.

Swent: Was that an option?

Livermore: You're talking about Mexicanization?

Swent: Yes.

Livermore: Well, that was much earlier. The mine was Mexicanized long before I joined the board.

Swent: I see. It was already Mexicanized when you were on--

Livermore: Yes.

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[1]See Langan W. Swent, op. cit.

Swent: That is, it was over 50 percent owned by Mexican--

Livermore: It was 51 percent owned by Mexico. That was a problem, but they were able to survive; they had to reinvest some of the money in Mexico, and that was one of the problems, I think--it had something to do with the decision. I was involved as a geologist, and it looked to me like the mine was--that partcular main mine was bottoming at depth. The company is still continuing; they have other deposits around there. They're still operating.

Swent: They've discovered very rich deposits just on the other side of the hill, I understand.

Livermore: But the price was right, and there was this other company that was interested in it, and I think it was a wise move. The Mexican partners--well, there were problems there, not having control of the mine. Of course, before Mexicanization, that was a wonderful mine and a very profitable mine.

Swent: Do you still have your mine in New Mexico?

Livermore: It's just a prospect in New Mexico, yes. We're hoping to develop that sometime.

## The Hasbrouck and Sterling Mines, Nevada, Brought up to Date

Swent: Maybe you'd like to talk a little bit more then about these Nevada mines, to bring them up to date. It's been five years. I don't think you had mentioned the Hasbrouck at all.

Livermore: The Hasbrouck is a property near Tonopah, Nevada, that was another interesting epithermal occurrence. We did some drilling and proved up a very large low-grade body of gold ore. For various reasons, it wasn't quite economic. Those reserves are still there, and some day they may be mined. It didn't lend itself to heap leaching, which is the cheapest method to produce gold. If it had, that would've been economic. Because of the nature of the ore, it didn't leach very well in the coarse sizes. It's a resource, and maybe it will be mined someday.

Swent: In coarse sizes, you said?

Livermore: Yes. It has to be ground very fine to get recovery, but the ore wasn't good enough grade to justify the cost of fine grinding.

Swent: So that was a metallurgical problem.

Livermore: Yes.

Swent: But you still have that.

Livermore: We still have that, yes.

Swent: When you say "we"--

Livermore: I do. I have a royalty there. I only have part of the royalty, so there are other people. I don't own the property, I just have a small royalty interest.

Swent: And the Sterling?

Livermore: I think we discussed the Sterling, didn't we? Yes. That was in the list of the properties that we worked on.

Swent: Didn't you tell me that it had just closed?

Livermore: Yes.

Swent: Bring it up to date.

Livermore: It turned out to be a pretty good mine--

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Swent: In a case like that nowadays--

Livermore: Of course, I don't know how that works to have those big gaps in there. [referring to the editing of the interview transcript]

Swent: What?

Livermore: You have part of it in one year and then have another part five years later or something [laughs].

Swent: Oh, that's all right; don't worry about it [laughs].

Nowadays when you have to obliterate all evidence of a mine, it's harder to go back in and open it if the price goes up again, isn't it?

Livermore: Yes, it is.

Swent: That's one of the problems with--

Livermore: Well, particularly an underground mine, yes, because all the workings cave and it fills up with water. So it gets very expensive.

Swent: Is this an underground mine, the Sterling?

Livermore: Yes. However, in this case, there's not a water problem because it was above the water table. It won't fill up with water, but the workings tend to cave in, so it's kind of hard to open the mine again.

Swent: The Getchell--I had thought that you were still involved with that.

Livermore: No, I didn't--well, except the Pinson's right next to the Getchell. In the early stages of exploration, we at one time thought we might try to buy the Getchell mine. We did buy a portion of it. Pete Galli and I bought a portion of the Getchell holdings. Other than that, I really haven't had any connection with Getchell.

Swent: What about one of these others? Which one do you want to talk about?

Livermore: There's nothing except the Pinson mine. Of course, I'm out of the Pinson mine; I've sold my interest in both the Pinson mine and the Dee mine; I sold to my partners in both cases there. I still do have a royalty interest in the Pinson.

Swent: They're still doing well, aren't they?

Livermore: Still operating, yes.

Swent: The Preble was one that you mentioned. What's the status of that?

Livermore: I had mentioned that too. That's been mined out for some time.

Swent: Do you want to mention platinum?

Livermore: No, I haven't been involved with that.

Swent: Just in general--you were telling me about platinum--

Livermore: There have been a tremendous number of scams with platinum as well as gold. Platinum is famous for wild promotions, partly because the platinum is a difficult metal to analyze for, so a lot of people get spurious platinum readings and they think they have a big deposit. Most of them are scams. Of course, in this area there have never been any commercial platinum deposits in Nevada or California. The only platinum occurrences in the western United States are in Montana, actually.

Swent: People can always dream.

Livermore: Oh, yes. The rocks aren't right, actually. You have to have certain kind of rocks to get platinum.

Swent: I wanted a more information about the kind of vehicles that you used--or the transportation methods, I guess I should say, that you used. The Carlin I think you discovered on foot, didn't you?

Livermore: Of course we used mostly four-wheel-drive vehicles in Nevada. In Nevada you can go practically anywhere, even the tops of the mountains, but still you have to tramp along and you can't get away from the need of climbing the hills. So that was our main methods of prospecting. We would use a vehicle to get close to where we wanted to go and then just climbing, mapping, and sampling, and a lot of hiking in the hills.

Swent: Do you think this global position system is going to replace the tramping?

Livermore: That's very helpful to simply locate yourself. It speeds up the process of mapping because you can locate yourself accurately. With computers, of course, you can transmit that information back to a central point. Theoretically, you could be mapping out in the field, and by the time you get back to your office your map will be all compiled for you.

Swent: That would be nice, wouldn't it?

Livermore: Yes.

Swent: You don't have to go back and spend hours trying to transferring data to a map.

Livermore: So from that point of view, and of course particularly--I worked a lot in the tropics--in the Andes and the rainforests. In very high relief, it's very hard to know where you were and to locate yourself, for collecting samples or for mapping. So

that global positioning system is a tremendous advance there, and being able to locate yourself in areas where there are no maps at all. That is going to become a tremendously important tool for geological mapping.

## Colombian Horses

Swent: When you were in Colombia, how were you getting around?

Livermore: Colombia, of course, is a very rough country. It's very mountainous, and the road system really isn't that well developed, and it's amazing how many farms and even pretty good-sized haciendas don't have any road access. The roads are terribly tortuous, winding and narrow.

So getting around Colombia is a very slow process. The roads are very bad. A lot of access has to be by horse. So we did quite a bit of horseback riding and used mules for equipment. In some areas it is a horse economy, and they have beautiful horses there. They're small, but they're very, very tough and vigorous. It's the type of horse they call the Peruvian *paso*. They have a special gait: it's kind of a running-walk gait which is beautiful to watch, and it covers the ground very fast and very easy. It's very easy riding; you can cover ground almost as fast as trotting, but it's much more comfortable because you're sort of gliding along. It's very pretty to watch somebody riding along with that gait. So we did use a lot of horses in Colombia.

Swent: How does this work then? How do you rent a horse?

Livermore: In any village you can rent horses, and it's no problem because they have horses everywhere. As I say, a lot of the back country--the farming, of course, there are those steep areas; it's amazing how they can farm on these steep slopes. They had corn patches, and way back in the back country they say you have to ride several hours to get to the nearest little village. And then in the nearest village you're still pretty isolated; you'd have to drive over these terrible dirt roads for miles and miles to get to any kind of bigger town [chuckle]. So access is Colombia is very difficult.

Swent: Did you have a Colombian with you?

Livermore: Yes, we had Colombian geologists working with us. And we always had some Colombian helpers.

Swent: If some stranger comes up to me in a little village and wants to rent my horse, how am I going to know that he's going to bring it back?

Livermore: Well, that's a good question. They didn't require deposits usually, as I remember. They know for one thing you have your vehicle there, so I guess they could take over your vehicle. They know you're going to come back for the vehicle.

Swent: The vehicle is a four-wheel-drive?

Livermore: Yes.

Swent: A jeep or a Land Rover or something like that?

Livermore: Yes, that type of--.

Swent: So you leave that there and then you take off with the horse.

Livermore: Right.

Swent: Did you stay out overnight?

Livermore: We often did. We'd camp out or maybe stay at a little farm, what they called *fincas*.

Swent: You had to arrange for feeding the horses?

Livermore: It was grass. That's one thing about Colombia: it's so green. So that's not a problem. But yes, we stayed out--I remember one place we stayed, a little finca, with a woman who cooked for us there, and that was kind of convenient. More often than not, we would maybe go out for the day and then come back and stay in a little village, in some little hotel.

Swent: It's amazing how those things--and this is the modern era--but they were still--

Livermore: They haven't put much money into the roads in Colombia. They have got a pretty good rural electrical system, and they have power lines going out in the back country. But even some of the main roads were in very bad shape when I was in Colombia. Of course, it's difficult country to build roads in because it's so mountainous.

## El Transito Project in Honduras

Swent: What about Honduras? Where is your project there?

Livermore: Honduras is not quite as bad because you don't have the tremendous relief as in the Andes, where you're going up and down tremendous elevations. In Honduras the relief is not as great. It's only a couple of thousand meters. In Colombia, we were going up 3,000 or 4,000 meters. The problem wasn't as severe, but it's still a problem in Honduras getting around some of the back country. In a lot of those countries, when you get off the main highways the roads are usually built with broken rock because it rains so much. They hold up very well in the rainy season, but they're terribly rough to drive over [laughs].

Swent: What are you using there?

Livermore: We had four-wheel-drive vehicles there.

Swent: Horses?

Livermore: It just so happens that I haven't used horses that much in Honduras. In most of the places we've been to, there's some kind of road to get there. The country is not as isolated as parts of Colombia are.

Swent: So what are they? Jeeps or Land Rovers?

Livermore: Jeeps, yes. Any kind of four-wheel-drive pickup, or a Blazer--that type of vehicle. But you have to have them in that kind of country because the roads are very bad. Also, of course, it's very wet and muddy country. That's why you have to have these roads; if you get off the road you're just up to your hubcaps in mud right away. You have to have a good, solid road or you can't get around in that country. It's not like the Nevada desert.

Swent: What happens if you have car trouble?

Livermore: You just have to--

Swent: Have you learned to fix it yourself?

Livermore: You have to have a few tools and hope you can fix it. You can get a ride back into town. One of the problems you have down in some of those countries is thievery: you can't leave a vehicle out--they'll steal the parts right off your car if

you're not careful. We've had that happen a few times. So you have to be careful about that.

Swent: I remember when we were in Bogotá once, seeing people take the windshield wipers off their cars and put them in their pockets when they parked.

Livermore: That's right.

Swent: Just automatically stuck them in their purses or their pockets before they left the car parked [laughs].

Livermore: I remember when we were parked way out in a tremendously isolated area, and there didn't seem to be anybody living around there. We were out about a couple hours from the vehicle, and we came back, and we had obviously interrupted somebody who was starting to dismantle the vehicle because he had taken certain parts off. Luckily we were able to drive back into town. I think if we'd have been gone another hour [laughter] he would have had the thing torn to pieces.

Swent: You're on your way down there soon, you said.

Livermore: I'm going down there, yes.

Swent: It's in production now?

Livermore: No. We're working towards that; I think by the end of the year, maybe, it might be in production. It's kind of a slow process getting all the permits and everything. We have been working on that property for seven or eight years now, so it will be interesting to finally see something going there.

Swent: What do you call it?

Livermore: It's the El Tránsito. It's right on the Pan-American Highway; it's quite a good location.

Swent: That doesn't often happen.

Livermore: No. The only trouble is it's down on the coast, which is very hot. You get up to a little elevation there in that area, and it's a beautiful climate. But down at sea level it's awfully hot. It takes a while to get used to that. It never changes: day and night, 365 days of the year, it's just hot.

Swent: This is the Pacific coast, isn't it?

Livermore: Yes.

Swent: Is there a town there?

Livermore: Yes, it's a very small town. But luckily there's a motel there that we could stay at--it's on the Pan-American Highway--so we have a pretty good place to stay, actually.

Swent: Air-conditioned?

Livermore: Yes. It even has a swimming pool. So we're pretty lucky in that respect.

Swent: So you don't mind too much going there.

Livermore: No, except for the heat. It's hard to get used to that hot weather when you're just down there for a few days.

Swent: I remember once you told me how difficult the plane schedules were getting there. Is that still true?

Livermore: Yes, it's hard to get into Tegucigalpa, which is the capital. It's difficult sometimes to get in there. The service is better than it used to be. It's not a very big city, actually.

Swent: So you fly to Tegucigalpa and then rent something?

Livermore: Yes, we drive from Tegucigalpa, and it's about a two-hour drive. Actually, it's a good road, it's a paved road. It's very accessible, this mine. It's good from that point of view. Other mining areas in Honduras are much more difficult to get to.

Swent: And the politics aren't too bad?

Livermore: No, it's a pretty stable country. They have elections every four years, and they have two political parties. Honduras is a poor country, but they've never had the terrorism that Nicaragua and El Salvador have had. They've had some minor terrorism. It's a fairly stable country. We think we can operate there all right.

Swent: It's always a little iffy going into those places though, isn't it?

Livermore: Yes, you never know quite the government attitude--.

Swent: Do you have local partners?

Livermore: No, but my partner, Bruce Wallis--who is from New Orleans, actually--has spent many years down there, and he has some

quite good connections there. I wouldn't have gone into this thing otherwise, without somebody who was pretty knowledgeable about the country. You can get into a lot of trouble unless you have some pretty good contacts. There are plenty of slick operators in all those countries--in all countries, as far as that goes.

Swent: Do you want to say anything about Bre-X and what it's done to the gold mining industry? [laughter] We might as well; it's the current news story.

Livermore: We'll have to wait until we see what the dénouement of that is. We really don't know yet.

Swent: We may never know. It's given a bad name to gold mining, I'm afraid.

Livermore: Oh, it certainly has, yes.

Swent: It will scare off a lot of people.

Livermore: Is that about it?

Swent: What about religion? Your mother was--

Livermore: Oh, I don't want to get into that! [laughs]

Swent: You don't? Well, your mother was very religious, I understand.

Livermore: Yes, yes, she was. But I guess I'm one of those people who sort of have my own religion, I guess.

Swent: You're too busy to spend any time in church, obviously.

Livermore: Right.

Swent: Do you have any church connection in Nevada?

Livermore: Not really. I was brought up in the Episcopal church; I suppose if I have any connection it is with the Episcopal church--I haven't been much of a church-goer.

Swent: You've kept your connection here at Grace Cathedral.

Livermore: Yes. I'm basically a Nevadan, I guess--or half Nevadan and half Californian.

Swent: Well, you're getting to be more of a Nevadan all the time.

Livermore: Yes, I've spent quite a few years there.

Swent: You've been a very good citizen of both states.

Livermore: I've been very fortunate in my life.

Swent: You're doing a lot of good things with your good fortune.

What about clubs? Do you belong to any clubs?

Livermore: I'm not a joiner. I never have been a joiner in my life. No. Whether it's because I was out in the hills so much, I don't know. I've never been into that too much.

Swent: Is anybody in your family following in your footsteps? Do you have a successor?

Livermore: My nephew, Robert Livermore, is into environmental remediation, which is--

Swent: Is this the one in Salt Lake?

Livermore: He lives in Phoenix. It involves a certain amount of geology, but I can't say that any of my nephews are following in our footsteps. I guess it's typical of the modern era. My brothers were largely involved in natural resources--one of my brothers (Norman) was in the lumber business, I'm a miner, and another one's (Bob) a farmer, and my lawyer brother (Put) did a lot of natural resource work. But none of our nieces and nephews are in the resource business. They're all in the service business: lawyers or doctors, or some environmental work. But I guess that's kind of the generational change. Somebody's got to still recover the natural resources; somebody's got to do it. It's not a popular field any more.

Swent: No, it isn't. Who's going to take over running the ranch?

Livermore: Well, some of the next generation will. I don't know which one.

Swent: They'll be interested in that.

Livermore: Yes.

Swent: But you're not grooming a successor yet.

Livermore: No, they're all pretty busy.

Swent: They're building more houses up there for the next generation?

Livermore: They're talking about it. One of my nephews is building a house. Of course, we have a quite a few already. But we're talking about building one or possibly two more houses. But not right away.

Swent: There are a lot of things to talk about, but I think maybe that's enough for now. Do you think you've covered the ground pretty well?

Livermore: Oh, I think so, yes.

## XII MORE RECOLLECTIONS OF SCHOOL AND COLLEGE

[Interview 6: July 29, 1997] ##

### Miss Paul's School, San Francisco

Swent: This is July 29, 1997, and we are at Montesol, just filling in some of the gaps from our earlier interviews. You had said that you went to Miss Paul's as a child and you told me off the tape some more about Miss Paul's teaching technique.

Livermore: We didn't realize at the time, of course, but it really was a very progressive school at that time. The fact that it was just two houses down from the house was just kind of amazing.

Swent: Was it in her own private home?

Livermore: Own private home. Yes, the two maiden aunts, the Misses Paul, and then they had several others, mostly women. They had an elderly French teacher, a mademoiselle from France who taught us French. I forget who the other teachers were. But it was very loosely organized; we didn't have regular classes.

Swent: Was it just boys?

Livermore: No, it was boys and girls. I don't know how many there were. It was a small school. Twenty-five people maybe. But we had this system, I remember, we had the old mimeographed sheets on cardboard, pasted on cardboard. Then we'd read these lessons. When we got a lesson finished, we'd move on to the next lesson. There weren't any organized classes as such, so of course we had a lot of individual attention. The teacher-pupil ratio was very high.

In fact, we all of us--not that we were necessarily smart--because of the school, when we got into high school, we were about two years ahead of our contemporaries. In fact, both my brother George and I took five years of high school,

just kind of an extra year of high school. Then we took a whole year out before we went to college just because we were really too young to go to college.

The other thing about the school was that it was very informal. We used to come up here in the summertime and spend the whole summer at Montesol. In the fall, we were very relaxed about school; we'd get back to school sometimes two and three weeks late [laughs] in the fall and it didn't seem to make much difference. We'd just pick up where we left off. So the whole thing was very informal, but it was a really outstanding school. Unfortunately, when we moved over to Marin County, my youngest brother Bob wasn't able to take advantage of it; he, unfortunately, had to go to a public school, so he missed out on that episode. It was really a great school.

Swent: It went all the way through what would be eighth grade?

Livermore: I think so. I went one more year of grammar school. I went to Damon for one year, which was the successor to Potter School. It had gone out of business. Of course that was right in the middle of the Depression and all these schools were having problems. I think Potter School went bust. So I went to Damon for one year. So I guess we went through about the seventh grade.

Swent: And you had no textbooks, just these mimeographed sheets?

Livermore: I don't remember any books. We must have had some books, but I always remember clearly those boards.

Swent: What sorts of things did you study?

Livermore: Well, we studied all the regular courses. One of the things I remember, we had chess. We all learned to play chess; that was part of our instruction. And then we had a little garden: we all had to have a little plot of land back of the school which we got to plant. We planted flax, I think. Something like that.

Swent: Flax?

Livermore: I think that's what we planted. I forget what it was.

But other than that, we had French of course because we had a mademoiselle with us. So we all got sort of a basic grounding in French, which helped later in life because I think I learned the pronunciation; when I went to Morocco later and really learned French, it helped me to get the correct

pronunciation because I had learned some of it really early. I don't remember anything else particularly. The others were just mostly lots of three R's.

Swent: Math, science?

Livermore: Math and a lot of English. And simple science.

Swent: Did she have any particular philosophy about citizenship or history?

Livermore: I don't remember that. No, I don't remember that part of teaching. We all learned to read very early. I forget at what age I was reading, but we all learned to read early. I used to read out loud. We had the phonetic system so we could learn to read. In fact, my mother used to always say that I would read these books and I didn't know what I was reading at all. But I could figure the words out phonically and I could read them fairly well even though I didn't understand what they were.

Swent: What kind of books did you enjoy reading for fun?

Livermore: Well, it was typical boys' books. We had the Boy's Life, that was a favorite magazine. We read Treasure Island and all those great books. But the two magazines were American Boy and Boy's Life. Those were the two, I think, for boys. We read all the common books. We did a lot of reading.

Swent: You liked to read.

Livermore: Liked to read. We developed that up here at Montesol, particularly.

Swent: When you were up at Montesol as a child, there weren't all these other houses here.

Livermore: We all stayed in the one big house.

Swent: And is that the house that burned?

Livermore: It was burned down. Yes, we all stayed there. We had a hut out in the woods; we slept out in the open in the summertime. And then of course, we worked a lot up here, plowing, harvesting, picking fruit. So we were busy and we had a lot of chores. Then after lunch, we would all have to get out on the porch and read. We all had a book we were reading. So that was a standard: we had to read for half an hour or so before you went back to work again.

Swent: That sounds wonderful.

Livermore: Yes, it was.

Swent: Good for you.

Livermore: Yes, so we all developed an interest in reading.

Swent: Did your parents read a lot also?

Livermore: Oh, yes. My dad was a great reader. He was just constantly reading. My mother, too, but she had some other activities. But he was always reading.

Swent: When you finished at Damon School--

Livermore: Then we moved over to Marin County. So then I transferred to Tamalpais, another boys' school. That would have been my first year of high school. That was right in the middle of the Depression.

## Thacher School, Ojai, California, in the Depression Years

Swent: When was that?

Livermore: That was in 1931. I went to Tamalpais for one year and then I went down to Thacher for two years. That was, as I say, right in the middle of the Depression. My dad decided that he just couldn't afford Thacher. So I went back to Tamalpais for a year; and then I guess he decided that it would be nice if I finished up at Thacher so I went back to Thacher. [laughs] So I went one year to Tamalpais, two years at Thacher, then one year at Tamalpais, and one year at Thacher. So that was five years of high school.

Swent: Yes. A lot of adjusting to make.

Livermore: Well, I didn't--it didn't bother me too much.

Swent: Was another brother at Thacher at the same time?

Livermore: My first year; George was there the first year.

Swent: Then did Put go?

Livermore: He came later. He wasn't there when I was there.

Swent: George mentioned Thacher was such a powerful influence in his life, but he was there for consecutive years.

Livermore: He was there five years consecutively.

Swent: So that would be much more of an influence.

Livermore: He was a big horseman there. He was always in the gymkhana. He loved the school. We all did too, but he particularly I think got more out of it. It was very good for him.

## A Trip to Europe, 1936

Swent: So then you had a year in between school and college.

Livermore: I was still way too young to go to college. I was only about seventeen years old. So then I took a year and I worked up at the ranch for about six months. Then I went on this trip to Europe. We were very fortunate because our grandmother, my mother's mother, was a great traveler, believed in travel; and she gave each one of her grandchildren two thousand dollars for a European trip. That was a lot of money in those days. That was a wonderful thing. Now all these teenagers are just hopping over to Europe like nothing, but for teenagers to go over to Europe in those days was kind of unusual.

Swent: And from here, it was a very long way.

Livermore: So we all had these trips to Europe which were very, very rewarding.

Swent: Did you go alone?

Livermore: No, actually George and Norman, and a couple of other friends, we all went together but then we separated and we split up. But we were all more or less over there at the same time. Norman and George and a good friend of ours, Jim Green, and a couple of other fellows. As I say, I didn't to the Olympic Games but I was in Berlin. I wanted to go to Vienna, Venice, and some other places, so--

Swent: You planned your own itinerary?

Livermore: Yes, pretty well.

Swent: How did you travel?

Livermore: Well, we traveled around cheaply, you know, by train. We did a lot of bicycling in England. And in France we rented bicycles. I always stayed at cheap hotels.

Swent: Did you stay at youth hostels?

Livermore: No, I don't think we did. We stayed at little *pensions*. I don't think we stayed at youth hostels. Then we had various friends we visited, stayed with in different places. So that was interesting.

Swent: What did you gain from it that you remember?

Livermore: Oh, just generally broadening to see other countries. I was always kind of interested in history. One thing, in those schools, we took a lot of history. I remember we took a whole course just on English history, which I don't think anybody takes nowadays. You'd take whole semesters or maybe a whole year of English history. [laughs]

Swent: You had some interesting observations about Hitler and Germany.

Livermore: Well, yes, because I was--I didn't go to the Olympic games but I was in Berlin for several days. Just seeing the city and reading about how the economy had improved and the whole national feeling of confidence after going through this terrible Weimar Republic with their hyperinflation. People's fortunes were wiped out. It was a general feeling of optimism that Hitler was doing great things for the country; and I have often said--of course it's sacrilegious to say it, but I think that if Hitler had been assassinated right at that time in 1936 he would have been a hero. Nobody knew that he was going to become a megalomaniac at that time.

Swent: There was a good feeling then.

Livermore: Oh, yes. And we didn't see enough of what was going on of course to--. And you didn't get the feeling of militarism at that time. I don't remember seeing any of these mass--you hear about these Nuremberg mass demonstrations. I don't remember seeing that so much. You didn't get that feeling of militaristic buildup. We probably didn't see enough of the country, I guess.

Swent: It must have been a wonderful time.

Livermore: Oh, it was, yes.

Swent: How did you go over and back?

Livermore: We went over on a freighter, actually. Norm and I went over on a freighter from Los Angeles. We went down through the Panama Canal and across the Atlantic. That was an interesting experience; there were just four or five passengers. Then we came back in style. We came back on the Normandie. Beautiful ship. Some people say the most beautiful passenger ship that was ever built.

Swent: It must have been beautiful. Did you and Norm come back together then?

Livermore: No, he went on to India, actually. George and I came back together.

Swent: So you kept sort of rendezvousing?

Livermore: Yes. We'd meet and separate. We also had different things we wanted to see.

Swent: How long were you there?

Livermore: Oh, three months, I guess. Well, before that, we'd had a family reunion down in Texas. That was right after I finished working up here. And that would have been the winter of 1935, I guess, around Christmastime. And after that I took a trip to Mexico. This was one with my mother and my uncle and aunt. We went down and had a nice trip down in Mexico.

Swent: Mexico City?

Livermore: We went to Mexico City. Even in 1936, I remember there were still traffic problems in Mexico City. Of course, the streets hadn't been widened. And then we went down to Acapulco. That was interesting too, because at that time it was a little sleepy fishing village. Nobody around at all. I remember there was an American couple down there on their honeymoon. I often thought, "Gee, if you want to just get away from everything, the place to come would be Acapulco." Think of it now, of course, it's a regular Miami Beach but that was kind of interesting. And then it was right after that that I went to Europe.

We had one experience in England. A friend of Norman's had actually married the Earl of Berkeley and we visited the Berkeley castle, so that was quite an experience. That was kind of interesting. It was a very old castle from, I think, the twelfth century or something like that, which he had remodeled at enormous expense. All modern fixtures and stuff.

Swent: That must have been great fun. When were you doing the packing with Norman?

Livermore: Well, when I was in Stanford--

Swent: Had he started the packing business when you went to Europe?

Livermore: He had started the packing business. He had always been interested in horses. As quite a young boy, he went out to some friends of the family who had a very large ranch in Texas that was part of the King Ranch, actually. The names were Lassiter. It was either close to the King Ranch or part of the King Ranch, a tremendous ranch in Texas. He always enjoyed riding. He got very much interested in cowboys and riding. He learned how to spin a rope, for instance, like Will Rogers. He could do that, you know.

So he got interested in mule packing in the Sierra Nevada, and actually bought into a mule packing business. He was actually in the business. So we worked for him, all of us. I think all of us, Put, Bob, and George all worked for him in the summertime. And I worked for him for two summers or maybe three summers as a packer, which is an interesting experience. We got paid five dollars a day as I remember. But it was fun. Enjoyable up in that beautiful country. So that was an interesting experience during the summer in my first couple of years in college.

Later on, I went to Alaska.

Swent: You had mentioned that. But you told me Norman's influence on you was--that Norman had a big influence on your life.

Livermore: Well, he did. He got us interested in horseback riding and camping. He had the motorcycle; so then we all had to have motorcycles. So we sort of aped him and followed him.

## Motorcycle Riding

Swent: Did you have motorcycles in the city? In San Francisco?

Livermore: No, by that time we had moved over to Marin County.

Swent: I see. And you all whizzed around on your motorcycles?

Livermore: Yes, I had one. Of course, nobody had cars in high school in those days. But I had a motorcycle.

It was a Harley-Davidson. That was before the Japanese got in the business. So I rode the motorcycle to school every day. That was kind of unusual because no one had transportation to school. Then we used to take all of these trips all over the state. There wasn't much traffic then, but we never wore helmets or goggles or anything. We'd just go whizzing down the highways. But we'd travel all over the state, covered a lot of ground; just had a wonderful time riding around on motorcycles.

Swent: Who is "we"?

Livermore: Put had his motorcycle. But he and Bob, we didn't do it together because we had motorcycles in different periods. I had a motorcycle and then I went away. Put, he may have even taken my motorcycle. He had a motorcycle. So we all had accidents. Put had some very bad accidents on motorcycles. He banged himself up, and I had some accidents. That was later, when I actually hit a tree on a motorcycle--banged up my knees.

Swent: Where was that?

Livermore: That was when I was in the navy. That was later. I had a few minor accidents, skidding around, skinned up a little bit. Put had some quite bad accidents, actually.

Swent: How did your mother feel about all this? [laughs]

Livermore: Well, she was an amazing woman, really. She had five boys who were always getting into scrapes. She was the type that--she must have worried, of course, but she didn't show it much. She didn't tell us we shouldn't do this, do that, it was too dangerous. She was very good on that. I think that's one problem some of the modern mothers, is that they're too protective of their children. We all survived, luckily, to adulthood.

Swent: Your father?

Livermore: He was good. Of course, he encouraged us to take risks. It was very important for children to learn how to take risks and overcome them. If you're just fearful of everything--. I remember we used to climb trees; we'd go way up on the tops of these trees. Now they say, "Oh, that's too dangerous." But you have to know what you're doing, of course, what you can't

do. And you have a few mishaps then. You hopefully don't have anything serious.

Swent: Well, but then on the other hand, they pay immense amounts of money to go these Outward Bound camps and schools.

Livermore: And of course they have modern dangers, reckless driving. So these kids are exposed to other kinds of dangers.

Swent: Where they have less control.

So you did have the knee injury in the navy,

Livermore: That sort of bothered me and is still bothering me. I actually also injured my knee at Thacher when I was high-jumping. That was my first knee injury, actually.

## Sports at School and College

Swent: What about sports?

Livermore: Well, I engaged in a lot of sports. I never was I'd say a champion in a sport. I liked to do different sports. I never liked to specialize; so I played tennis; at Thacher I played baseball, soccer, and swimming. I was in a lot of different sports. I liked sports; I always have liked sports. But today everybody specializes and I possibly could have been very good in some one sport if I had specialized. I never did.

Swent: I guess basketball would be the thing now.

Livermore: Thacher didn't have a basketball team at that time. So I didn't play basketball. Later, they did. They didn't have football, either. But I did play football at Tamalpais; so I have played football. So I played most of the sports.

Swent: What about at Stanford? Did you do any sports?

Livermore: I was on the freshman baseball team, but I didn't--I started to go out for the varsity. I might have made the team, but I had labs because I was taking engineering all the time and that interfered with sports. I don't know that I would have made the team anyway, so I just stopped. But I like to play baseball. Thacher being a small school, we didn't get enough really good training. For instance, we weren't exposed to curve ball pitching [laughs]. And I had to come up against

curve ball pitching in college. I couldn't handle that very well. But now, of course, kids get all kinds of experience; and they have these automatic pitching machines, you know, so you can practice on them.

Swent: Were you a pitcher?

Livermore: No, I played first base. Norm, of course, was a very good baseball player. He was captain of the team and played in the Olympics.

Swent: In 1936?

Livermore: Yes. They had an exhibition game, that's what it was. The first time they ever had baseball and it was just an exhibition between two All-Star College teams.

Swent: And you didn't go to see it?

Livermore: Well, I didn't want to wait around. I would have had to wait around for several days. And I don't know why, I didn't want to sit around that long. I had to get on. I had a certain amount of time and I wanted to see as much as possible.

## Alpha Delta Phi Fraternity Stanford

Swent: What about your fraternity at Stanford?

Livermore: Well, I joined the Alpha Delta Phi fraternity mainly because my two brothers had joined it. You either joined a fraternity while I was there or you lived in a dormitory. So the fraternity had the advantage of an overall living community. I never was a strong fraternity person. In fact, I think you could argue against fraternities because it was kind of a social system at Stanford. Those fraternity people felt they were superior to the people living in dormitories. I never particularly liked that, so I wasn't a strong fraternity supporter. I did stay there. I made some good friends there.

I remember when I was at Stanford, they had the sorority system, a very bad sorority system because they had so few sororities and all the girls were clamoring to get in--

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Livermore: I was just saying that there were very few sororities at Stanford and tremendous competition, and a lot of heartbreaks for the girls that couldn't get into the sororities. In fact, a lot of girls actually dropped out of the school if they didn't get into a sorority, so it was a bad system. And Stanford dropped the sororities. I don't think they have revived them. The fraternities were a little different because there were a lot more of them.

Swent: Did you keep up your San Francisco social life while you were at Stanford?

Livermore: I was not a very social person; never have been a big social person. I worked very hard at Stanford; I took engineering courses and it kept me pretty darn busy. I can't say that I had a tremendously active social life.

Thacher being a boys school, we weren't exposed to girls, so when we did have a dance, those of us who were supposed to be the real outdoor types, we wouldn't go to dances. We would go camping instead. [laughs] So I was sort of backward I guess you'd have to say in my relationship with girls at an early stage.

Swent: Yes, well, it's all right.

Did you go to the dances at Stanford?

Livermore: Well, I did, yes. I had some friends there, but not like a lot of people at Stanford.

Swent: You have been on an engineering advisory counsel at Stanford.

Livermore: Well, the earth science advisory council.

I graduated and I've always been interested in Stanford and supported the school. It has changed a lot, of course. The field that I was in, which was mining geology and mining engineering, doesn't really hardly exist anymore. Everything has moved toward environmental science. Stanford had a very active mining department when I was there, but that's all changed. So the school, the earth science department, they're training very few people in my field right now, which is economic geology.

But I still support it. It's a wonderful school--of course a much better school. When I was at Stanford, it wasn't really that outstanding. It was only after I left when President Sterling took over and the science department,

Silicon Valley developed, and the engineering, that Stanford became such an outstanding university. We never admitted it, but it didn't really compare with UC Berkeley at that time.

Scout Camp and Impetigo

Swent: This came in a little earlier, but we might mention it. You had said your Boy Scout experience was very brief.

Livermore: Well, our dad was very active in the Scouts. He was on the board of the Boy Scout Council. Norm had been an active Scout because he was in San Francisco at that time. He was active in the Scouts; I think he became an Eagle Scout. Then we moved over to Marin County and since we had Montesol, we didn't have to feel the same need for scouting like urban kids would.

At some point I guess somebody decided that I should go to Scout camp, so I had to join the Scouts. I became a Tenderfoot, which is about as far as I got. Because then I went to the Scout camp and the first thing I did when I got to Scout camp was I caught impetigo, which in those days, before antibiotics, was a very annoying skin disease which produced big scabs on your skin. It was very, very unpleasant. The only treatment was to peel off the scabs and put an ointment on it. It was a very contagious disease, so you couldn't go swimming. It actually spoiled my whole summer because I couldn't go swimming, I couldn't do anything. [laughs] It took literally months to all heal up.

Swent: It was a dreadful disease.

Livermore: It really was, but I mean, it was just annoying. It didn't interfere with activities too much except for swimming. You couldn't swim because it was very contagious. That's how I caught it, swimming up at the camp.

Swent: So that was the end of your scouting.

Livermore: That was the end of my Scout career.

Swent: I never had impetigo, but I remember it was just something people were very aware of and afraid of.

Livermore: I remember scabs as big as a fifty-cent piece on your knees and every place.

Swent: And it doesn't even exist now.

Livermore: Well, with antibiotics, no. They kill it right away now.

Swent: What about polio?

Livermore: Well, we had serious problems with polio but luckily none of us caught it. It was active in those days, of course. A lot of my friends, people I knew, got polio. We were just lucky.

Swent: Well, Montesol protected you from some of those, probably.

Livermore: Yes.

## Letters from Parents

Swent: Do you think we should jump up a few years, then? We're just filling in things today. I wanted you to mention your mother's letters to you.

Livermore: Well, of course we were away at boarding school and our mother carried on a great correspondence. I didn't reciprocate very much. I was a terrible letter writer; I just hated to write letters and still do.

Swent: I've noticed. [laughs]

Livermore: [laughs] It was an effort. I was supposed to write a letter from school once a week. I always thought, "I can't figure out what would be interesting to put in the letter that my mother or father would be interested in." I guess I wasn't correct. Anyway, it was always a struggle. But she wrote wonderful letters. And my dad did too, and going on after, when I was travelling around in geology during the war, he wrote us all long letters. I've kept all those letters, so between his letters and my mother's letters, I've got quite a volume of letters. The trouble is she didn't put dates on them. That was unfortunate. He did. But it's kind of hard to date them because she didn't put a date on them.

Swent: Did they write individually to each son?

Livermore: Yes. Well, no, I think in some cases my dad would send copies around. But if it was something that was particularly important, he would make it individual. Of course I was close to my dad because he was an engineer also, so he was very

interested in what I was doing. Particularly early in the career, he was always making suggestions--you might want to do this; you might want to do that--but he never pushed any of us. He was always helpful in making suggestions about different things. One time I'll always remember he thought maybe I might be interested in going into research, scientific research. I was always interested in science, but I wasn't really quite inclined that way. I was more interested in the applications of science.

Swent: Did you write to your brothers? Did they write letters to each other?

Livermore: No, not too much. Yes, I have some letters from my brothers. But not too much. We did some, yes. George, I think, was the best. He wrote some wonderful letters when he was in the service. I was very bad at that, I don't know why. I never could quite get inspired to write letters.

Swent: You were busy doing things instead of writing about it.

Livermore: Yes. I was not a good communicator. Never have been. I'm not very proud of that.

Swent: You've done fine.

## XIII "POST-RETIREMENT" ACTIVITIES

### The California Academy of Sciences and Dr. G Dallas Hanna

Swent: Would you like to say something about the California Academy of Sciences?[1]

Livermore: Well, I got interested in the Academy through--my dad, of course, he had been president of the Academy of Sciences and he'd been interested a long time, going back to his safari in Africa. He had been interested in the exhibits of African heads that were contributed mainly by Leslie Simpson. But also some of them were contributed by my dad. So he got very interested in the Academy at that time, and that was way back in the twenties.

He was a president for quite a few years, was always supportive. In 1938, they had an expedition to Alaska, which was run by one of the Academy scientists. It was actually an oil company trip because he had two roles; he did--

Swent: Who is he?

Livermore: Dr. Hanna. He was another very interesting person. Dr. G Dallas Hanna.

Swent: G with no period; right?

Livermore: That's right, yes. He was organizing this trip to Alaska, which was an oil company expedition, and my dad heard about him. He needed some people up there to move their equipment;

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[1]For more on the California Academy of Sciences, see Catherine C. Campbell, "Ian and Catherine Campbell, Geologists: Teaching, Government Service, Editing," Regional Oral History Office, The Bancroft Library, University of California, Berkeley, 1989.

these were human pack mules, you might say. And so they needed about four or five husky young people. He thought it might be an interesting experience for me, so I signed up for it and I actually took a quarter out of Stanford. I was up there for about four months and it was a fascinating experience. That's what we did. We had about a ton of equipment--I think I talked about this before.

Swent: Yes, you did, but I didn't know it was connected with the Academy of Sciences.

Livermore: Well, that's how it started. So I had that experience and I met this Dr. Hanna, who was an absolutely remarkable man. He was a real Renaissance man: not only was he an expert paleontologist and one of the greatest experts on diatomites in the world, he was also a consultant for oil companies because he knew how to classify and distinguish a small tiny fossil which they call foraminifera, which were very important for oil companies in sorting out stratigraphic units. So he was hired as a consultant by Union Oil Company.

I got to know him. I used to keep in touch with him at the Academy. I used to go out there quite a bit. He was one of these fellows, just a workaholic; he was there seven days a week working all hours. Among other things, he was a mechanical person; he could build anything. After the war--Did I put that in there?

Swent: No.

Livermore: They wanted to build a planetarium and the instruments to project these stars. The only people in the world that made those instruments were at Zeiss in Germany. Well, after the war, the Zeiss plants had all been bombed, so Dr. Hanna decided he'd just build one himself. And he did. Designed all the optics, built the whole thing. He was absolutely an amazing person.

Then later on, quite a few years later, they asked me to become a trustee, which I did because of those connections. And I served a term there and enjoyed it. I wasn't able to participate as much as I liked to because of living in Reno, I couldn't attend all meetings. I'm still interested in the Academy, it's a great institution.

Swent: It is. Put, I think, was later on the board too, wasn't he?

Livermore: No, actually, they wanted him to be on the board, but I think that he didn't want to be on the board. So then they shifted to me. [laughs] I think they really wanted a lawyer.

Swent: I see. Well, I imagine they wanted a scientist--which would be you. As a trustee, what responsibility did you have?

Livermore: Well, we had different--

[phone interruption]

Swent: I had asked you if there was anything particular to say about your being a trustee at the Academy of Sciences.

Livermore: Well, nothing. I am interested in what they're doing. Of course, the Academy is going through some tremendous problems right now which I'm not involved in. It looks like they're going to have to move out of Golden Gate Park. At least the museum part. I'm still what they call an emeritus trustee, so I'm still somewhat involved. Honorary trustee, I guess they call it.

Swent: You're still welcome to write checks. [laughs]

Livermore: Yes, right. [laughs] And I get all the minutes. But I don't attend all the meetings anymore.

Swent: Well, it's a wonderful institution.

Livermore: It is. They don't get the support they should. I don't know why that is. Particularly corporate support. They're not very successful in cultivating corporate support.

Swent: That sort of thing isn't quite so appealing now.

Livermore: No.

## A Trip to Armenia in 1995

Swent: Well, we have several things still to talk about. You really didn't say anything about your Armenian trip. Was that significant?

Livermore: Not really. It just was kind of more of a tourist trip and supposedly going over to look at some mines over there, but--

Swent: But you were there at an interesting time.

Livermore: Well, it was interesting.

Swent: This was in 1995?

Livermore: Yes, 1995. The reason I went over there--when I was in Iran, with Newmont--I think I mentioned that before--this Armenian person was my sort of general factotum and we travelled around together. Did I mention that?

Swent: I don't think so.

Livermore: Anyway, he's the one that brought to the attention of Newmont some properties in Iran, so I was in Turkey at that time and had finished up my Turkey work. So I went over to Tehran and we were traveling around the country with this man. This man's name was Tigran Serajian. Anyway, he was very helpful to me because we would go into these little tiny villages in Iran and the first thing he would do would be to look up an Armenian family. And all over Iran, all over that country, there are Armenian families.

They would welcome us with open arms. They knew everybody, the right people to see. So it was very, very useful having him there. Then, unfortunately, I got sick over there. I got hepatitis and that cut short my visits with this man. So then I came back. I had never heard from him after that.

Then in 1995, I got a call out of the blue from Tigran. He said, "Would you like to go to Armenia? I think there may be some mineral potential over there that's worth looking into." I was pretty sure I wasn't going to get involved in mining in Armenia, but it sounded kind of intriguing to go to Armenia. I'd heard a lot about the country when I was in Turkey, so I said, "Yes, sure, I'll go over."

So I went over. He had great hopes that I was going to get something going. Of course, all expatriate Armenians are all sort of interested in trying to help the country. We talked to some government officials and really didn't get very far.

But I had a very interesting trip over there to observe this country which was in terrible shape economically and politically. The aid they had been received from Moscow--they had had very strong aid for many years--that was completely cut off. The market for their industries was mostly Russia--that

was cut off. They had a war with their neighbor, Azerbaijan, going on. And their energy supplies were next to zero: the lights went on only for a few hours a day.

It was a terrible mess. And you would see all these buildings all around the town of Yeravan, the capital--it was a beautiful town with big wide avenues--you would see these buildings with construction cranes all around, and they were all idle. The buildings were just shells. And you would see all this construction that had just stopped overnight. So there was enormous unemployment. And yet, the most amazing this was that you would walk down the street and people seemed to be well dressed. There were no beggars, no homeless people. You just wondered how was the whole system working.

I remember we met over there a nice Armenian who showed me around. We took some trips to beautiful countryside. Unfortunately, the country is very weak in resources: agriculturally, it's a mountainous country, and about all they had was sheep. It's a very poor country. So anyway, we travelled around the country. But it's very pretty. From a tourist's point of view, it is beautiful. Old monasteries. It could be quite important to them from a tourism point of view.

The trouble is that most countries you get people that are speaking English; in Armenia, like in most of the former Soviet Union countries, they did not want them to learn English. So they all spoke Armenian and Russian. All the street signs were in either the Armenian alphabet, which is another alphabet, or the Russian alphabet--so you can't read any of the street signs. [laughs]

And I tried to hire an English-speaking guide and they said, "I'm sorry." It's unbelievable. "We don't have any English-speaking guides." So anyway, this fellow--

Swent: Your Serajian spoke English.

Livermore: Of course, he spoke English. But then he left. And I was there by myself for about a week. I got by. There was some guy there that showed me around. He and his wife, who was Russian, they could speak a little English. You could get by, though. He said, "I'm going to take you to the symphony." So we went to a beautiful symphony hall, crowded with people, a fine orchestra, chorus all dressed up in white tie. Just like you'd see in New York City. And I said, "How in the world can these people afford to go to the symphony?" He said, "Do you know what these tickets cost? Twenty-five cents."

Swent: Oh my!

Livermore: They are very strong cultural supporters. Who subsidized the thing, whether it was the government or private business, they carried all this on and people could still afford it. It was still the same system. The rent was practically nothing and the food was subsidized, so they had this sort of a safety net so that people could survive without really practically any income. It was an amazing sight to see how this system was working. How it worked at all--

But they had enormous problems and I don't know how they are going to pull out of it. There were enemies all around them. They were fighting with Azerbaijan on the east. The Georgians don't like them. Their former enemies were Turkey on the south; they hate each other. The only country that is somewhat friendly and is not a very good friend is Iran to the south. And they were talking about building a pipeline from Iran because they have a terrible shortage of energy. Anyway, that didn't work out from a mining point of view. I didn't think it would, but it was an interesting experience.

Swent: What sorts of mineral resources do they have?

Livermore: Well, they have a few gold mines there. The one gold mine I was going to visit was right on the border of Azerbaijan and they had a war going on there, so they didn't advise that. But it's not rich in metals. There's no petroleum although they're right next to the enormous Baku oil fields, but that's controlled by their enemy, you see. Azerbaijan is not going to give them any oil. But they're very smart, intelligent people. They'll work out of it maybe somehow.

Of course, the whole story of Armenia has always fascinated me: how they were pushed around by the Turks; the history of the old Armenia, which is now Turkey, is a fascinating history. Wars on all sides and they were massacred, and they would keep coming back. Then somebody else would conquer them and raze all the cities. I have a book on Armenia; it's fascinating how they survived. And now they only have a tiny little part of what used to be Armenia. The main part of Armenia is now all Turkey. The Turks drove them all out after the First World War. You know about that.

Swent: There was a big exodus after the first World War.

Livermore: First World War. And that was even almost a worse genocide than the Holocaust. You don't hear about it so much.

Swent: People used to use the expression "starving Armenians."

Livermore: That's right. We used to hear that. They were sort of like the Jewish people; they were too smart. The Turks didn't like them around because they were the merchants and the intelligentsia. The Turks were jealous of them, and they just told them you have to get out of the country. They gave them about two, three day's notice.

Swent: A very ancient culture.

Livermore: It's quite a story. But they're very much like the Jewish people. They were not going to give up their identity, their culture, and their religion. They have their own language and alphabet. I think we can cross some of that off.

Swent: No, I think that's all very interesting.

Moving up here now, I thought you should expand a little bit more on your decision to leave Newmont.

Livermore: I think I went into that, didn't I pretty much?

Swent: Do you think you did?

Livermore: I think so.

Swent: Your life would have been very different if you had stayed.

Livermore: That's right. I would have probably gone to New York. Yes, I think I explained that pretty well.

Swent: You said a little about what you enjoyed in New York.

Livermore: I enjoyed the two years I was there, but I didn't want to end my career in New York. I wanted to get back out West. I wanted to get back into field work. That was the main thing. My job was becoming too administrative. And I wanted to get back to Nevada. I thought there was still a lot of opportunity in finding more gold deposits in Nevada. Simple as that.

Swent: You certainly did that, certainly did that.

Well, the things that I have left on my list are Montesol and Walker Lake and Corona--

The House at Montesol

Livermore: Well, Montesol, you ought to get Norm in on that because he can give the very early history. He remembers a lot more about this, because, after all, he's seven years older. Both he and George. Also, George has got a wonderful memory.

Swent: He talked some. You haven't see his oral history.

Livermore: No, I haven't seen it, no.

Swent: Let's just, for the record, why don't you talk about the things that are in the house here, a lot of memorabilia of your father's African safari. Is that photograph one that he took?

Livermore: No. That was just a gift. I think Sara's [Dunsford] family got that for me.

Swent: But it is Africa?

Livermore: Yes, but it has nothing to do with the safari.

Swent: But you've got an eland head here, and a--

Livermore: That lion and-- Those two wood inlays, whatever you want to call them, were given to me by Arthur Brant. Those are very nice. He acquired them some time ago. He and his wife gave those to me. They're not connected with the safari.

Swent: One is a tiger, isn't it?

Livermore: Yes. But they're African scenes, but they're not connected with my dad's safari. They're interesting. You know, they're inlaid wood. But other than that-- You see, when all those heads were distributed, I didn't have a house so I didn't really get any of the heads. But they're all distributed around the different brothers.

Swent: They had been in your father's home?

Livermore: When we had the house in Ross, the whole ceiling, the halls-- we had a great big room just sort of like this, all these heads all around. George has got some of them. And Bob has some and Norm has some.

Swent: Now you have the eland.

Livermore: I have the eland, yes.

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[leaves room to bring mounted dyk-dyk head]

Livermore: That's full grown.

Swent: I saw one when I was in Kenya. They're lovely little things, just about six inches high. They look like a little rabbit, actually.

Livermore: Hard to believe they're full grown.

Swent: And then the eland head is sitting on the floor, waiting to be hung up.

Livermore: Well, okay--

Swent: You were up meeting the president this weekend at Tahoe, weren't you?

Livermore: Oh, that is so current. That's not important, though.

Swent: Tahoe isn't important?

Livermore: Well, yes, but I mean, oh gosh, we can just go on and on and on.

Swent: I know. But you didn't say anything about Walker Lake or the Corona Mine.

Livermore: They're really separate. Talking about Public Resources, we talked about that, didn't we?

Swent: I didn't feel that you did enough.

Livermore: Didn't we talk about that and the mining laws, stuff like that?

## Trying to Develop Public Support for Walker Lake, Nevada

Swent: You talked some about the mining law, but I thought you might want to talk a little more about what you're doing now at Walker Lake.

Livermore: It's a long process. It's a multi-year process. It's going, unfortunately, very slowly. [pause] Well, I think that covers it, really.

Swent: Do you really?

Livermore: There hasn't been too much going on lately. This fellow that we have hired, he's trying to develop some public support. They have a little organization now and newsletter, but it's a very slow process. I'm a little bit annoyed, really, because I'd like to see them-- They just make these endless studies--well, not us, but the university and the federal government, oh my God, they're all making all these studies. Nobody's buying any water, which is what we need to do. So we're just very lucky that we've had these good winters; we've had three years of respite. I'm a little discouraged how it's going along, actually.

Swent: Well, you need to get Senator Reid out there.

Livermore: Yes, well--that's right. But it hasn't attracted the attention that-- But he's going to get this going, I think. But we have to get some political backing. We're dealing with the ranchers, you see, and they're very strong politically. And they all say, "Sure, we want to solve the problem," but they're not willing to give up their water.

I think that covers it.

Swent: Well, maybe so.

## Turning the Corona Mine into an Archaeological Site

Swent: Let's talk about the Corona mine a bit. Does this road here go to the Corona?

Livermore: No, no. This is a through road that goes all the way around. It's what they call Livermore Road; it goes by the Oat Hill Mine. The Corona is on a separate road, the Oat Hill Road, which is the old historic road that is being preserved. In fact, we've just given some land to the park, you know, for the Palisades.

The reason I bought the Corona Mine: being in the mining business, it's interesting archaeologically--this old Scott furnace. There are two ages of furnaces there: one is the turn of the century and the more recent one was in the sixties.

Swent: Just for the record, it's a mercury mine.

Livermore: Mercury mine, yes. I knew there was an environmental problem there because there's an acid water drainage problem there and the [mine] dumps [are] there. So one of my ideas was to clean up this pollution problem and try to restore the area, and fix up this Scott furnace, make a kind of archeological site out of it. That's what my objective is.

That's what I was in the process of doing until we got sued by this lawyer who's trying to force us to do what we were going to do anyway. So we hope we can avoid litigation, but we're in the preliminary stages; of course, he says he wants to clean up the pollution problem, but his past history is that what he really wants is to get some money. He's representing an environmental organization called United Anglers. He's representing them. We don't know that they are doing this, but what they have done in the past is, what they want you to do is instead of cleaning up the problem, is give some money--what they call to mitigate the problem--and they clean up some other stream in which they are more interested. So in a way, it's a kind of a shakedown. What we're telling them: we want to clean up the problem, which is logical.

Swent: What creek, what watercourse is it on?

Livermore: It's James Creek, which flows into Berryessa Lake. You see, all this mercury is going down into Berryessa Lake. It has been for a hundred years or, well, hundreds of years. And so all these drainages are-- And we're just one mine; there are a whole series of mines. Eventually, this whole drainage--there may be some bigger project to clean up the whole drainage, but I'm trying to solve just this one little problem there. We'll go over there and take a look at it.

Swent: Is there fishing in the creek? Or has there been?

Livermore: There used to be, before they drove this tunnel. But that was way back in 1900. There are fish in the creek, but I think you probably could not eat them because of the mercury content. You could catch them and put them back. The worst part of this acid mine drainage-- You know what that is, the oxidation of pyrite; the iron, as it comes out and hits the air, the iron becomes precipitated. That's what I have in those little beakers. It stains. This problem is more of a visual problem than anything.

Swent: It's not really toxic, is it?

Livermore: No. Well, it doesn't meet the clean water standards. It's got a little mercury in it, a little iron. It's not <u>bad</u> water.

Probably it wouldn't have attracted any attention at all if it hadn't been for this staining. That's one reason I want to get rid of it, because if we close off this tunnel, stop this water, hopefully over a period of time the winter rains and the rocks rolling around will grind away the staining and eliminate this very unpleasant visual problem.

Swent: Didn't you say that the tunnel had been closed and water had backed up inside?

Livermore: Yes. Well, that's another problem because there's a pool of water backed up in this tunnel. In order to get back in this tunnel and plug it, we have to open this portal. There's several hundred thousand gallons of water backed up in there which are all this acid water; so we can't just let that water run down the creek. The Fish and Game [California Division of Fish and Game] would not allow that.

We're trying to figure out some other way to do that and to get the Fish and Game to approve. One system would be to spray the water into the air, and in the summertime the water would just evaporate and it won't actually run down the creek. That's what we're trying to figure out, is how we can drain this tunnel without getting the Fish and Game down on us.

Swent: What was the original source of this acid drainage?

Livermore: Well, it's pyrite.

Swent: Underground?

Livermore: Underground, yes. It's pyrite. And this mine had a particularly lot of pyrite in it, more than most mercury mines, and that's what causing all this iron. The Oat Hill Mine, which is right next door, doesn't have that kind of problem.

Swent: It's in a different kind of rock.

Livermore: Different kind of rock, exactly. It's more sandstone and it doesn't have the same amount of pyrite, so there isn't an acid mine drainage problem. It's confined to the Corona. The Corona was not a big producer. That tunnel was driven in 1925, so that water has been pouring out of there ever since. Nothing has changed since 1925.

Swent: But the portal had been closed.

Livermore: Yes, it's been closed a long time. And the water just breaks out through the cave at the portal, about fifteen, twenty gallons per minute.

Swent: And the furnaces were used, then, for processing the mercury. They're still there in good condition?

Livermore: Well, that's what's interesting: the old Scott furnace, which was built around 1900, is still there. It's beautiful. Quite an imposing structure built out of volcanic tuff--blocks which they sawed out in those days; they sawed them into rectangular blocks and they built a lot of the structures like that. Nice. Beautiful white structure. You'll see it.

Swent: Isn't it the same as what they built Arequipa [Peru] out of?

Livermore: Yes, yes!

Swent: And that's all still there at the Corona.

Livermore: Still there. It needs to be cleaned up a lot.

Swent: Who did you buy it from?

Livermore: I bought it from Don Emerson, a partner in the Vallejo Quicksilver Mining Company. This property had been in this family for over a hundred years, since the mine was first opened up.

The portal to this tunnel is inaccessible; it's way down at the bottom of the creek. So what we're planning on doing, because we can't get material down there very readily, what we're planning on doing is drilling a hole up on the road, about four hundred feet above it and hitting the adit, and then pouring gravel and concrete down this drill hole. We hope that that will seal off the water. That's our plan. But in order to do that we have to get it opened up. We don't have a good survey. We have to open it up so we can get a survey and know exactly that. We have to hit that with a drill hole; it's only five feet wide, so it's kind of tricky to hit that with a drill hole.

Swent: And how far down is it?

Livermore: Four hundred feet. It's not very far.

Swent: Oh, but that's still a long hole.

Livermore: So that's the plan.

Swent: So you can't just undo the portal and go in.

Livermore: Well, we could; we could build a road down there. Actually, this is maybe a better way to do it anyway, because you put this stuff in the top. You could come in and haul stuff in there and just pump concrete in, but I think we can make a better seal by grouting.

Swent: How did the people get down there to mine?

Livermore: They had an incline track. They never mined any ore out of it, you see.

Swent: Oh, really?

Livermore: No, it was a bust. They drove into the vein and it was dead. So they never had to hoist any ore out of it. They just dumped the ore in the creek. And they had an incline, I think, for lowering supplies down there, but mainly I guess they just walked down there. It never was--

Swent: What were the furnaces processing?

Livermore: They did mine on the upper levels. You see, this was driven four hundred feet below the upper levels and they were hoping that it would all be ore. Of course it wasn't.

Swent: But the upper levels had ore.

Livermore: Oh, yes, they had ore.

Swent: Because I saw something from across the canyon that was on an upper level.

Livermore: You'll see them up there.

Swent: Well, that's quite a project that you're getting into there.

Livermore: Yes. And of course this lawsuit doesn't make anything easier.

Swent: And you're trying to get permits? Or you're delaying?

Livermore: I'm going to meet this fellow tomorrow, the state person. I'm just going to see what we have to do. Of course, he doesn't like this lawyer because this lawyer has kind of embarrassed the state agency. He's saying, "We're doing your job for you. You guys are supposed to be controlling this."

Swent: But if you're doing it anyway--

Livermore: Well, that's the thing. I hope there's a reasonable solution to it. I was talking to our lawyer and said, "It seems to me if we can go to a judge and say, 'Here. We're going to fix this problem ourselves. Why do we need a lawsuit?' and a reasonable judge should accept that."

Well, the lawyer said, "Most judges aren't reasonable." [laughs]

Swent: But you can prove that that's what you had started to do.

Livermore: Of course the judges, you see, all want settlement. They don't want these things to go to trial. So they tell you, "Why don't you guys settle?" The way to settle is to give them a chunk of money. And we don't want to do that. In a similar deal, they got four hundred thousand dollars from a company. You see, what they say is: you figure how much it's going to cost to fix this mess up--say it's going to cost a hundred thousand dollars; you just give us the hundred thousand and then you won't have to pay a fine.

Swent: Until somebody comes after you later.

Livermore: Oh, that's exactly right. You put your finger on it. How do you know somebody's not going to sue you later? That's not satisfactory. Of course, this is what is called a "citizen's suit," and theoretically, if you've got this thing settled, I think that you could not have another citizen's suit. But nothing can stop the state agency from suing you. But they've done that; in several cases, they've done that.

Swent: I don't understand this acid drainage thing because if the substance is there--mercury, pyrite, whatever--is there naturally in the earth, and with rain and just natural precipitation and percolation, it's going to be leaching out, isn't it, just naturally?

Livermore: That's true. The problem exists even before there's ever any mining. See, the trouble is you don't have what they call baseline measurements. If we'd had the measurements a hundred years ago to show that there was mercury in the sediments--but we have no way of proving that.

## XIV UPDATE, 2000

[Interview 7: January 14, 2000] ##

### A Few Years out of Exploration in Nevada and the United States

Swent: I remember when we started this many years ago, you said that at that time you were reluctant because you thought the best part was still ahead of you, and I guess that has turned out to be true, in a way. You're off and running on an exciting new venture now, but when we stopped interviewing earlier, you had kind of withdrawn from field work, hadn't you?

Livermore: Yes.

Swent: You had this venture in Honduras.

Livermore: That's right, and earlier in Colombia and the property in New Mexico that I was working on. But I was not working in Nevada because I had turned over the Cordex Exploration Company to Andy Wallace, and I didn't really want to compete with him particularly, so I really sort of got out of exploration in Nevada and the United States, really. And I was occupied, had quite a bit going on at the ranch; I was the managing partner at the ranch, and that sort of occupied me, with the water and other things. The Public Resource Associates was going along smoothly; Susan Lynn was really running it. I didn't feel I had as much to do there, so I was really sort of--although I was busy, I was looking for something else to do.

Swent: You had the Corona Mine project.

Livermore: Well, I had the Corona, yes. So I was busy, but then Andy Wallace, who had been managing exploration ever since I turned it over to him--what happened was that Andy Wallace--the company, Rayrock, was taken over by Glamis Gold. Glamis wanted to hire Andy Wallace because he was an outstanding exploration person. He had a good organization, and outstanding files. Andy thought at the time that he might go to work with Glamis,

but they just couldn't work out a deal satisfactorily, so Andy decided that he would try to do really what I did in 1970, which was to go out on his own, which was really taking quite a risk as far as getting funding because of the present state of the mining industry.

So he talked to me about it and asked me if I wanted to join him on this new venture. [chuckles] It did appeal to me because my first love has always been field work, and this was an opportunity to get back into field work. He was going to do a lot of the administrative work. So I thought it over a while, and I decided I would do that.

So we have formed a partnership called the Cordilleran Exploration Company.

## Cordilleran Exploration Company Formed with Andy Wallace

Swent: That was the original name of your first--

Livermore: It sort of went back--we have been going around in circles, actually. So then the next question is, how are we going to raise some funding. This is one of the poorest times to raise money for mining exploration there is, but of course Andy has a good track record and I have had a certain amount of success, so we were very lucky to get one company that we knew quite well, and they decided to participate. And then we--

Swent: Can you name them?

Livermore: This is Franc-Or Resources Corporation.

Swent: They're Canadian?

Livermore: It's a Canadian company based in Montreal.

Then we thought we should have at least two companies, so then the problem was to find a second company. That was more difficult. Actually, the president of Franc-Or helped quite a bit because he had a lot of good connections. He actually really was responsible for getting the second company that we knew something about, which is a company called Ranger Minerals, Ltd., quite a well-known company in Australia.

That took several months. In the meantime, we were already doing exploration and generating some projects. Just

toward the end of '99 we finally got this other funding, so now in the year 2000 we're ready to go ahead with the program. We have rehired a couple of the former Cordex employees. We have a small organization. So I'm looking forward to getting back in the field.

I'm kind of a junior partner now because Andy, who used to work for me for quite a few years, is going to really do the administrative work, which I don't like anyway, so I'll just be the field man, the prospector. [chuckles]

Swent: You bought yourself a four-wheel-drive vehicle.

Livermore: A new four-wheel-drive vehicle. We have a young fellow that has been working for Cordex who's going to be my assistant, a very, very fine young fellow named Jon Vinson. We hired the old secretary that used to be with Cordex. She went with Glamis; now she is back with our new company, Cordilleran Exploration Comapny. We have several of the old people. We have some of the nucleus of the original organization. Including the same office. We're going to move right back in the same office. [laughs] So it's really kind of an interesting turnaround.

## Building up Files and an Exploration Library

Swent: How do you go about building--you mentioned files.

Livermore: Well, that was a little bit of a problem. You see, we built up these files over--what?--almost thirty years. We had a wonderful set of files. Actually, the files really belonged to me. I made an arrangement with Rayrock--or they made an arrangement with me--they were concerned that if something would happen to me, what would happen to the files, so I did agree to turn the files over to them, but I would have the right of access to them.

Swent: These are mostly maps?

Livermore: These are lots of maps and books and publications and--tremendous files. We have looked at hundreds of properties. So anyway, they had taken over the files and had physically moved them to another spot in Reno, but the agreement said that I had access to the files. In fact, they even have to provide me with an office to look at the files. But of course it's not like having it in the same building, so that was kind of

disappointing. I thought at one time we might be able to buy them, but who knows?

Swent: You mean buy the files or buy Glamis?

Livermore: No, no, buy the files. I made a mistake when I made the deal with Rayrock, because they were worried about something happening to me. See, I never thought that something would happen to Rayrock! [laughs]

I should have provided that if Rayrock went out of business, the files would revert back to me. But I still have access to them, so it's not too bad, but--

Swent: But it's not terribly convenient.

Livermore: But in the meantime, we bought another library, which is quite an extensive library and has actually replaced a lot of the things at the original Cordex. So we're actually in pretty good shape.

Swent: How did you happen to buy this library?

Livermore: Well, that was another company that went out of business here in town. Of course, a lot of these companies are folding up shop, you know, because the price of gold is so low. Exploration is way down. That's another thing, of course, you see, that we're looking at. See, when I started up Cordex, the price of gold was still $35 an ounce, so there was no gold activity in Nevada at all, so we really got in on the ground floor.

Now the cycle is down again, and there's not a lot of exploration activity. A lot of ground has become available now, and properties are being offered, so we think this is a good time to maybe get back into exploration and hit the next up cycle. Whether that works out or not, I don't know. [chuckles]

We have already several properties. We will be ready to drill a couple of them pretty soon. We're optimistic, but of course it's not as easy as it was thirty years ago because there has been an enormous amount of work done in Nevada in the meantime. A lot of the obvious prospects have already been tested. Now the targets often are some of these deeper ore bodies, which are harder to find, so we've got our work cut out for us, but anyway, we'll see what happens. [chuckles]

## "You Still Have to Get out on the Ground and Do Geology"

Swent: How is it different from what it was thirty years ago? Are you using GPS [global positioning] devices and things like that?

Livermore: Yes. Of course, remote sensing is beginning to come in more. There's a great expert out at the university. There are some resources out there that we think will be useful. There are new techniques, but you still have to get out on the ground and do geology. Nothing replaces that. Which is what I like to do, of course, anyway. So we use geophysics; we try to develop new methods of down-the-hole borehole geophysics. But I wouldn't say there has been any tremendous breakthrough.

Swent: No?

Livermore: No, not making it that much easier to find gold mines. It's still a lot of work.

Swent: It's still not easy.

Livermore: Still not easy, no. Of course, there are a lot of ore bodies being found on the surface because of this invisible gold that the old-timers missed, but of course that has been--the surface has been pretty thoroughly gone over, so now we have to look at mostly covered areas and deeper areas, so that makes the job of course more difficult.

Nevada is a fascinating state. It's just unbelievable the amount of mineralization there is. As a matter of fact, we have a prospector working for us. He's out there all the time, panning. He comes up with stuff all the time. We think there are still things to be found.

## Nevada, Still the Best Place to Work

Swent: What about the regulations?

Livermore: Well, Nevada is rated--you know, they made a survey of all the states in the United States and the provinces of Canada as far as favorability for regulations, economics, geology--and Nevada two years in a row has come out on top. It's got the best combination of favorable geology, very favorable access for exploration; it's easy to get around, and you get a lot for your money; and the regulations are still better here than

anywhere else. So the regulations are getting tougher, and of course they're closing off more and more land, but Nevada is still the best place to work, although we won't confine ourselves to Nevada necessarily; we'll work in other states, too; but only in the United States: California and Arizona and other states.

## Working for Change in the Mining Law

Swent: When we talked last, a couple of years ago, you were still doing quite a lot of work with a group out of Denver that was working with legislators on the mining law.

Livermore: Oh, yes. Well, that--I really haven't done anything on that. I really got pretty discouraged on the mining law. We made a big effort, and we tried to develop some consensus legislation, but it has been a complete stalemate, the mining laws. The Republican control of Congress and then the environmentalist group--they're just at loggerheads. Nothing is going to move until--of course, if the Democrats gain control of Congress, then of course that will be a change, and the mining law will go through--maybe not too favorable for the industry, but--it keeps coming up every year, but the industry can't get what they want, and the environmentalists can't get what they want, and there's a stalemate.

Swent: But you're not doing so much?

Livermore: No, I have kind of given up on it, really. I might get back into it at some point, but no, I haven't really done anything on it lately.

Swent: You had developed a very good reputation as being a mediator.

Livermore: Well, I thought I could develop some consensus, but at least right at the moment, it doesn't seem possible--the industry, of course, has taken the position that they want only very minor changes, and they're not willing to really compromise. Of course, they've been successful so far. They've been holding off the environmentalists. But I don't think they can do it forever. Because there have been basically no changes in all these years. The only thing that will change, I think, they might bring in a royalty, which the industry has agreed to.

And then, of course, the Bureau of Land Management is trying to bring in new regulations. They're trying to go

around the mining law, and that's going to be a big issue now because a lot of people think that they're violating the mining law and I think there's going to be a lot of litigation on that because the industry says that they're trying to do an end run on the mining law with these regulations.

I did get involved with a review of a study by the National Academy of Sciences. They were brought in to try to analyze the regulations and how they should be changed. Well, that part of it is going forward, but I've only been very peripherally involved in that. The law will be changed. I don't know when, but I'm afraid it won't be for a few years, unless there's a major change in the Congress.

## Reclamation Research Project at the Corona Mine

Swent: How are you getting along at the Corona?

Livermore: Well, it's going very slowly. We ran into a lot of problems there. I had just hoped we would get into some solid ground there, but it's very bad ground. We've got to do a lot of timbering. Hughie Ingle has been working hard on it, although we have shut down for the winter. But we're going to keep plugging away on it next year, but it's a much bigger problem than I thought it was going to be. Opening up these old mines is always difficult, but you always hope for the best! [chuckles]

Swent: Why are you opening it up?

Livermore: We have this water, this acid water, and we either have to treat the water or else plug the adit up completely. So what I'm trying to do is get into the source of the water, this bad water, and either--it's really kind of a research project--either devise some way of treating this water, which would be better because then the water could still flow out of the adit --for fish downstream--or else just plug the thing off. Of course, that's quite difficult. So I still don't know what the answer is until we get farther in the tunnel, technically an adit. So that's a slow process.

Then we're doing other reclamation, remediation around the Corona, trying to revegetate and recontour the dumps and things like that.

## Coping with Frivolous Lawsuits

Swent: You were being sued.

Livermore: Well, we were being sued, but we finally got that settled. We had two lawsuits, one on the Corona and one on the Oat Hill, and we fortunately got--one of them, particularly the Oat Hill, was a completely frivolous lawsuit--there was no basis for it at all--but we finally got both of them settled, luckily. Unfortunately, it cost a fair amount of legal fees. So we got that out of the way.

Swent: Good.

Livermore: Now we're being sued for the spring water.

Swent: Oh, really?

Livermore: Yes, I don't know whether should get into that, but that's--

Swent: Well, it's all part of the same--

Livermore: Well, it's sort of another [frivolous] suit there. Somebody is saying, our sole competitor, is saying that--

Swent Your competitor?

Livermore: That's Cobb Mountain.

Swent: Oh, the spring water. This is not the water at the Corona.

Livermore: No, no, this is a whole different--this is spring water. They're saying that the water comes out of a borehole near a spring; it doesn't come out of a spring. So they're saying--accusing--we're not involved directly except peripherally, but the say that Perrier is mislabeling this water because they're calling it mountain spring water when it actually comes out of a borehole. Well, actually, most of the spring water in California actually comes out of boreholes close to a spring because that water is much purer--spring water on the surface usually has bacteria or something in it. But they're not going to get anywhere with this lawsuit; it's just another nuisance.

Swent: Meanwhile, you're producing a lot of water.

Livermore: Oh, yes, we're still producing water. It's just another headache for my brother [Putnam], who's the lawyer of the family.

Swent: Are you still managing the ranch? You're still the manager.

Livermore: I'm the managing partner, yes.

Swent: That must still take a lot of your time.

Livermore: But my brother, Put, is taking over. I'm going to be more busy here in Nevada; I won't be able to get over there quite as much as I have been, so--so that's bringing it up to date, pretty much.

## The Future for Gold and Silver

Swent: Honduras.

Livermore: Nothing's doing down there. I'm trying to get people interested. It's a very difficult time to be raising money. We were just very fortunate to get some funding for Cordilleran. Also, I have this property in New Mexico, and the same situation there. They're not--neither of them are bonanza properties; they'll eventually become mines, I think, but we've had people interested up to a point and then somehow or other they can't raise the financing, so nothing is doing on either one of them. I think we just simply probably need better prices before anything will happen on either one of those two.

Swent: What do you think is the outlook for gold?

Livermore: Well, who knows? According to the so-called experts--no one is an expert on gold, of course--there's never been a time of greater uncertainty in the price of gold than there is right now. Tremendous amount of speculation, enormous amounts of paper gold out there. So it's very hard to say. Of course, with this economic boom we have--and of course the economic boom is not going to last forever, and this low inflation, low unemployment--that can't continue forever. So we don't want to see it happen, but of course if we have a slowdown in the economy, that probably will help gold, so I think gold will maybe work its way up next year.

Swent: Are you limiting your exploration activities to gold?

Livermore: Yes, gold and silver, gold and silver pretty much, yes. Because I think the price of silver is the one that's definitely going to go up. Just like we used to say about gold after the war. I remember old Don McLaughlin had a standard

speech to make back in the fifties. He would say, "Well, the price of gold is going to go up now; it's just a question of time." And you see--it took about twenty years!

Swent: Well, eventually he was right.

Livermore: He was right! [laughs] So that's what they have been saying about silver: it's got to go up. And it will, one of these days. It might take quite a bounce-up. So that's what we're sort of hoping for.

Swent: Well, it's an exciting business, John.

Livermore: Yes, I'm enjoying it. To get out in the hills, you're trying to figure out the geology, which is very complex here in Nevada. It's a puzzle. It's just a fascinating puzzle to try to unravel and try to figure out where an ore body might be. It's good exercise. And northern Nevada is just an ideal place to work. The weather on the whole is good. It never gets too hot. Kind of cold in the winter, but it's just a wonderful place to do field work.

Swent: You might tell what Andy said about your funders who are coming to visit you?

Livermore: [chuckles] Well, they said they were coming out to look at the program we had planned, which was of course very logical. But Andy said, sort of jokingly, really--he said he thinks that maybe one of the main reasons they want to come out here is to see whether John Livermore at eighty years old can still hike up and down these mountains! [laughter]

Swent: They'll find out that you certainly can. You said you're doing six and seven miles with no trouble.

Livermore: Well, the old legs are holding up pretty well so far.

Swent: You're still not using the elevator to your apartment?

Livermore: No, I still walk up. It's good exercise.

Swent: It certainly is.

Livermore: I don't say I do it every day, but I do it fairly often, yes.

Swent: That's wonderful.

What else?

Livermore: Well, that's about it, I think. I want to see what this will all lead to. I don't know of any other exciting new developments.

Swent: You mentioned that you're going to more meetings now. You went up to Spokane.

Livermore: Well, I have to get back into industry again, you see. And part of this is contacts. You have to make contacts. You have to kind of know what the other people are doing, and opportunities come along. You have to keep up with the literature, the new scientific techniques, so it's important to do that, so I am doing that more.

## Good Work At the Ralph Roberts Research Institute

Livermore: There's some very interesting stuff coming out of the university. They have this research program out there.

Swent: At Mackay School of Mines, University of Nevada-Reno.

Livermore: The Ralph Roberts Research Center for Economic Geology. They've got some graduate students now that are doing some very interesting things now. So we have to get up on all that. They came up with a new mineral out there that's very interesting. A mineral which is very closely related to the Carlin deposits. One of the things, they have never been able to date the Carlin deposits, and now they have found this mineral that they think is very closely related to the Carlin deposits in time, and it's a mineral that has rubidium in it, which they can date. And they're dating this rubidium at thirty-nine million years. There was always a big puzzle as to what was the age of the deposition of the Carlin type deposits; the ages would range anywhere from forty million to twenty million or older or younger, or even up to a hundred million. But now I think they have pinned down the age, thirty-nine million years--which is fairly recent, actually.

Swent: I guess! [laughs] Well, this must please you. I remember years ago you were saying that one of the problems was that nobody was doing any research.

Livermore: Now, it's interesting to me. For the first time industry had gotten together, and it's something that's never happened before. A woman out at the university was able to get this thing started. Mary Beth Gentry.

Mary Beth Gentry, Tommy Thompson, Jim Taranik at Mackay School of Mines

Swent: You helped a lot, too.

Livermore: Well, I helped some, but she was--I supported it, but she got these companies together, and they hired a man by the name of Tommy Thompson. That was the best thing they ever did. He's an outstanding man, and he has put this thing together now, and they have more graduate geologists working at the Mackay School of Mines than I think at any Western university right now, and they're all on these projects.

It shows you what good work they're doing because these very bad times in the industry right now, the industry is still supporting it--there have been a couple of companies that have dropped out, but it's getting funding, so it's really a very good program.

Now, of course, we've got the geophysical department that Jim Taranik is starting up there, with the Brant chair, which I had something to do with. He's building up that department. The Mackay School of Mines is really developing, I think--improving a lot in the last two or three years. So we're trying to get more students in there. We're trying to encourage more undergraduate scholarships, trying to get more students coming into the school, which is a problem for most of these schools, actually, is to get undergraduates.

People don't want to go into geology and mining engineering now. It's kind of an interesting shift. It used to be a popular field; it's not as popular as it used to be.

Swent: I thought it was kind of sad, and certainly indicative, that in the *Wall Street Journal* there was only a two-inch article about Cyprus-Amax being acquired by Phelps Dodge, and Asarco being acquired by Grupo Mexico. That whole thing just in the end sort of went by without any public comment at all.

Livermore: Yes. Well, that's a bad trend, I think. I'm glad at least Phelps Dodge didn't get all the companies. That would have been a very bad situation. To me, to have only one copper company--but of course, there's Kennecott also.

Swent: We talk about "the industry," but there are very few players left.

Livermore: It's true everywhere. It's a very bad trend. Everything is getting bigger and bigger and bigger. The small operators in mining and the small farmers, the small businessmen--they're all having a difficult time. I don't know whether that will ever reverse.

## Hugh Ingle, Independent Mine Operator, Last of a Breed?

Swent: Our friend, Hugh Ingle, may be the last of a breed.

Livermore: Yes, he was one of the last of a breed, all right.

Swent: It would be very difficult.

Livermore: I was talking to his son Hughie about, "How are you going to carry on after your father's death?" He had a little mine down there that he's been working. He said, "Well, I'm going to carry on." And he said, "*We*'re going to carry on." So I said, "Who's the 'we'?" "Well," he said, "my mother's going to help."

Swent: Oh, my! Well, she worked hard at the Corona years ago.

Livermore: I guess she's going to run the hoist or something; I don't know.

Swent: Do you think she--

Livermore: No, I think he was sort of joking. But he kept saying "we." So I don't know. She's quite a gal. Anyway, we'll see what happens. I don't think he can continue to work now by himself.

Swent: It would be awfully hard. Well, he's pretty courageous to start out now.

Livermore: Yes, he's an amazing guy. So--

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Livermore: But he's very independent. He's like his dad; he won't work for anybody else. He works alone up at the Corona, you know. I told him this time he's got to get a helper out there working underground. He wrestles that timber around all by himself.

Swent: Will OSHA allow that?

Livermore: Well, [chuckles] I think they don't know about it but no, I don't think they would. I don't know about that. He did have a helper for a while, but unfortunately the guy got hurt a little bit. Anyway, he likes to work alone. Of course, he's husky. But I'm going to insist when he goes back this spring that he'll have to get somebody--because working underground, something can always happen. The adit is getting quite a way back now.

Swent: If--I shouldn't say if--when you find another Carlin, a gold prospect out here in your exploration, is your plan to go into developing it?

Livermore: Well, it's the same thing we did with Pinson, of course, and Dee. Our backers would take over--see, this Ranger particularly is an operating company. They have a large mine in Africa, gold mine.

Swent: Not just Australia then.

Livermore: No, not just Australia. So they would be the logical one to step in and take over the operation, so it'll be the same group. They don't need outside financing. They shouldn't need outside financing, so they might borrow some money--no, the same group is perfectly capable--just as Pinson did and all the Cordex partners, when they went into production, they just formed a new partnership but of the same people and just went ahead into production.

Swent: You aren't planning on building up a development staff?

Livermore: Oh, no, I'm not interested in that. Never have been. Too many headaches.

Swent: You just want to find them.

Livermore: Find them, yes. That's what the interesting part is, yes. No, I wouldn't want to get into that.

## Difficulties in Foreign Exploration

Swent: And you're limiting yourself, you said, just to North America. Just to the States.

Livermore: I think you can spread yourself too thin, you know. And foreign countries--I went into Honduras mainly because of this

partner I had who was already in there. He had been there for a number of years, a very nice fellow who happens to have the name of Wallis but is a different spelling, W-a-double l-i-s. He really had good connections down there, and he knew all the high muckamucks, including the president, actually, at that time.

But to go into a foreign country without really good connections, it's very difficult. You don't know who to trust and to get honest lawyers or--you have to hook up with somebody, local person that you can trust. It's just too complicated. There is plenty to keep us busy here in the United States.

## Trip to Cuba, 1999-2000

Swent: Tell about your trip to Cuba. You just got back several days ago.

Livermore: Yes, I had a fascinating trip.

Swent: I want to hear about that.

Livermore: And, you know, you heard about this little boy [Elián Gonzalez].

Swent: Yes.

Livermore: Well, I was right in the middle of it because my hotel is--very close to the U.S. Interest building. We don't have an embassy. We have what they call the U.S. Interest. And that was a rallying point. Every day I was down there, they had 50,000 people demonstrating in front of our Interest Center. And they bused them all in there. Did you see it on TV?

Swent: No, I didn't.

Livermore: They all had T-shirts on that had a picture of little Elián. There were speeches, and everybody said, "You ought to be careful. Don't go down there. They'll jump on you." Well, I didn't go right in the crowd, but I got down close by. But they were all very friendly. They're not mad at American individuals; they're just mad at Washington--and mad at those Cuban-Americans. God, it makes me so mad! The way they tell Washington what to do.

Of course, what they want is to come back to Cuba and just take it over like it was under Batista. They're not interested in democracy. They want to just be running Cuba with this group of people who will take over the whole country. Of course, the Cubans don't want them back. So they're kidding themselves. They're not going to get back to Cuba.

Swent: What did you get to see in Cuba? What did you do?

Livermore: Havana is a fascinating place. It's like an enormous museum. The Havana Vieja, the old--you know. They have these beautiful buildings. You don't realize that Havana was a tremendously wealthy country, starting off in the days of the Spanish galleons and then on into the 19th century, when they had this sugar boom for a while there. They made enormous fortunes off of sugar, till the price dropped. And they built these mansions. A lot of them were sort of crumbling, but now they're restoring them all, you know. And beautifully restoring them. They're making them into little hotels and museums. You see, Castro is putting a lot of money into it. Now he's really going after the tourist dollar. They're on a dollar economy now. Everywhere you go in Cuba, you don't use local currency at all; you can just spend dollars.

But when they open it up to Americans, it's going to be a very popular tourist place. It's got a beautiful climate, beaches--I wasn't interested in the beaches, but interesting old colonial towns.

Swent: Did you get out--

Livermore: I went out to two different places. One was a beautiful little town called Piñales. [chuckles] Of course, I had to see a mine while I was down there.

Swent: Sure [laughs]. What did you see?

Livermore: Well, I saw a famous--but it was sort of a joke, but there's nothing spectacular, just pyrite. But anyway, this is--[shows specimen]

Swent: A specimen that you got.

Livermore: This is a very famous copper mine called the Matahambre Copper Mine. It's not working now. It's worked out. But anyway, I just sort of--it's a souvenir. So I went out to this mine. I heard about it for years. It was a very profitable copper mine. American Metal Company operated it. But now, as I say, it's pretty well worked out, I think.

Swent: Is this specimen copper?

Livermore: No, that was pyrite. But it's the type of ore, but sometimes--this probably has some copper in it, but not much. No, this is just pyrite. That's all you can pick up on the dump there.

Swent: It's not operating now, you said.

Livermore: No, no. So it was funny. I went out to see this very beautiful country--you know what this karst topography is?

Swent: Oh, yes.

Livermore: You've seen pictures of Guelin in China, with all those hummocks--beautiful hummocks of limestone.

Swent: They have karst topography in Cuba too?

Livermore: Yes, and that's unusual for Cuba; that's right. It's the most spectacular part of Cuba. You have these hummocks of limestone, a beautiful valley, where they grow tobacco. So that's where I was going out and visiting. But it turned out that this copper mine was only about twenty, thirty miles away, so I couldn't figure out how I was going to go out there.

Near the hotel there was a guy who says, "I'll take care of that." He was one of these fast-talking guys I was a little bit suspicious of, you know. So he said, "I know a fellow down the road who's got a car." And so we went down there [laughs]. He had this 1949 Buick with broken windows [laughs]. It was all banged up.

So I said, God, I don't know what I'm getting in for here. Anyway, I hired these guys, and by gosh we were puttering along. We go up a little bit of hill, and just barely get to the top of the hill. And they had to stop, put in oil every few miles. [laughter] But by gosh--they didn't really know exactly where the place is, but we found it. And I got back all right!

Swent: Good! [laughter]

Livermore: Oh, that was really quite an adventure.

Swent: Did you get to San Juan Hill?

Livermore: No, I didn't.

Swent: You had said you might try to get there.

Livermore: Yes, but that's way out at the east end. They said there isn't much to see there, really. If I had more time, I would have gone. Santiago--but somebody said that Santiago is not that interesting. The place I went to is a town called Trinidad. It's a beautiful colonial town which has never been developed.

The other place I went to is a town called Piñales, and that's in the other direction. And that's where they have this karst topography. Beautiful area. Nice hotel. You're looking out over the valley. And caves--they had caves. You go down the cave. I've been in a lot of caves, but it was the first time I was in a cave where you get in a boat, going through the cave in a boat.

Of course, one reason I wanted to go to Cuba was to try to understand how the whole system worked. You know, we think it's so horrible; Communism is so terrible, you know. And you remember the Congress said you can't send that little boy back to slavery! I mean, those people there aren't slaves. It's a controlled economy, and they're poor, but they don't have slums like the South American cities do, horrible slums with the tin shacks. You don't see that there; their buildings are substantial. They're kind of rundown, very short of housing, but--they're all poor.

They're not as well off, of course, as when the Soviet Union was helping them. They were doing quite well then. So they're having really tough times, but compared with South American countries, they don't have unemployment because they keep people working; that's the Communist system, of course. And they have some kind of a safety net.

I don't know how repressive it is. Of course, he [Castro] doesn't of course allow any opposition, but--see, one of the things when Castro came in, a lot of--like in Chile, there was a strong opposition group there they had to wipe out. Like in Argentina, you know, they killed all these people. But he didn't have that too much, I don't think.

Swent: They went to Florida.

Livermore: Well, that's exactly right. They went to Florida. There was a little opposition to him in one area, but for the people, the poor people, my gosh, he was their hero. So he didn't have to do that sort of liquidation, like Stalin did, I don't think. And he has, of course, political prisoners, I'm sure. And he has executed one general down there who was in drugs, but--so I don't know how repressive it really is. Of course, they have police all over the place, naturally.

And, of course, you can't be getting up in the square and roasting Castro, of course, but it's quite interesting how--I don't know how it would be to live in a Communist country. I just don't know how it would be. It's the fear, of course, that worries us. I don't know whether they have--you know, these guys that are always turning you in all the time, like in East Germany, the informers. I don't know whether they have that system, where you can't be sure that your neighbor isn't spying on you. That's, of course, not very pleasant.

But when you look at the poor people--it's one thing to look at the middle class, but you look from the poor people's point of view, they're a lot better off now than they were under Batista. They had no education, no health [care]. They have a very fine education system and very good medical system, although we don't let any medicines go in there. So stupid!

Swent: Yes, and shortsighted.

Livermore: I don't know what's going to happen, but to get rid of Castro, it could be chaotic.

Swent: Would be, probably.

Livermore: It would be chaotic. People in Washington don't think [...], "Gotta get rid of Castro." It could be much worse, because it's very possible that a dictator will rise, another dictator will arise right away, a right-wing dictator. Actually, it's much better off to provide services and to open the country up and let Castro sort of gradually phase out of the picture, and maybe some oppositional leader will develop. There are none now. I don't know why we don't seem to learn.

Swent: But there were a lot of American tourists there, were they?

Livermore: Not too many. It is illegal. It's illegal to go to Cuba, as an individual.

Swent: I know. You went--

Livermore: I went through Mexico, Cancun. There are a lot of tourists there, but they are mostly Canadians and Germans and British. There were a fair number--as a matter of fact, there was a group from Los Angeles that I hooked up with, and they were a special group of eighty that were arranged through Tom [Livermore, nephew] that I hooked up with from New Year's Eve, so there probably were a fair number of Americans. I didn't actually run into too many.

Swent: Were they there as journalists or something?

Livermore: No, no.

Swent: Just tourists.

Livermore: You don't have to be part of a professional group any more.

Swent: Oh, I see.

Livermore: See, they don't stamp your passport down there, so nobody knows you're there. [chuckles]

Swent: I see.

Livermore: And you're not supposed to spend--that's one problem, of course. You're not supposed to spend any money in Cuba. They can get you for that. I think they have actually stopped two or three people, but I think the State Department is looking at the whole thing.

Swent: They must be, yes.

Livermore: They're not going to worry about--it's going to gradually open up more and more.

Swent: You said you had a good time New Year's Eve.

Livermore: Oh, yes. Beautiful party out in the plaza in front of the cathedral. They had a beautiful dinner with favors and drinks.

Swent: Wonderful music?

Livermore: Yes, wonderful. Dancing and music. They had a floor show. I left at two o'clock in the morning, and they were still going strong. They probably were there till five o'clock in the morning. And they have that music, you know, that's so rhythmic. And the people, you know, they're just moving all the time. The taxi driver's got the radio going, and they're all moving [laughs].

Swent: You said you saw "Buena Vista Social Club" [documentary film].

Livermore: I saw the movie. But, you know, I tried to figure out where it was. Nobody seemed to know where the original Buena Vista Social Club was. I don't know. I didn't try that hard. But anyway, actually, you sort of get a little bit tired of the music after a while because it's on everywhere. At every function, you have every little restaurant, every little bar,

in every--there's no place where any people get together that they don't have some kind of little group coming in, playing. But it's--in a certain sense they don't have a lot of variety to it. They sing these songs. I don't know what they're saying half the time because--of course, every so often they'll play, you know, "Cielito Lindo" and things like that. But a lot of it doesn't have much melody to it. It's just terrific rhythm, though. And it's great for dancing.

I remember there was a woman there, near our table. I'll bet she didn't stop for four hours. All she was doing was just moving like that [demonstrates], to the music. Really not dancing, but she just did that for--you'd think you'd get sort of tired of it after a while.

Swent: Good for your circulation.

Livermore: Something in their system: When that music is going, they just can't seem to be still [laughs].

Swent: It's good for them.

Livermore: Yes. Anyway, it will certainly be a very popular tourist place. There are some beautiful small hotels that are opening up in these old buildings.

Swent: It will be nice.

Livermore: Beautifully decorated. The food wasn't outstanding, really, but I guess in some of the fancy restaurants there are, but the normal Cuban food is nothing to brag about. It's beans and rice.

Swent: Plantains.

Livermore: Yes, plantains, yes.

Swent: Rum?

Livermore: Yes, sure, there's plenty of rum. I didn't partake of it too much. I did bring a few cigars back.

Swent: Could you find anybody who would smoke cigars?

Livermore: My niece's husband smokes, yes. And actually, Andy Wallace. I gave some to Andy Wallace. He smokes a cigar once in a while.

Swent: Does he? Not too many people do now.

Livermore: No. Well, these are sort of special. They're very good cigars, of course, and quite expensive. They kind of smoke them on special occasions. I don't know of any steady cigar smokers.

Swent: So where's your next trip?

Livermore: Oh, I have to be around here for a while. I have to stay close to home, get this exploration going.

Swent: Out in the field?

Livermore: Yes. Yes, I've taken my vacation now for a while. As I say, I've been wanting to go to Cuba for a long time. Too bad that George [Livermore, brother] didn't go. He would have really enjoyed it.

Swent: Yes.

Livermore: Well, he had just come back from Europe. He was a little bit worried about the complications of it. Of course, when I came back, if they had asked if I had been in Cuba, of course, I would have to say I've been in Cuba. They have, I think, stopped accusing people, but--so I thought they might ask me if I had any cigars or anything like that--and my passport didn't say anything, so the guy said, "Where have you been?" I said, "I've just come from Mexico." And he said, "Well, did you have a good time in Mexico?" I said, "Yes." (I was only there about two hours.)

Swent: [laughs]

Livermore: But I was there.

Swent: So your passport didn't even say Mexico on it.

Livermore: It's stupid because you have to clear customs in Mexico. You just go around the corner, and you have to go through the whole business even if you're only there just two hours. Yes, you can't just go right through to Havana. Your baggage has to be cleared and all that stuff, so--now I think it's a question of time because they'll have direct flights to Havana. In fact, I think there's already one now from New York direct to Havana. So it will be more readily available. So that's something you should think about maybe. You would enjoy it. This is the time to go down there. It gets pretty hot in the summer, I think.

Swent: Oh, I'm sure it does.

Livermore: And it rains a lot. It was humid even this time of year, but the humidity gets very high in the summertime, and it's warm. I thought it would be much hotter than it was. If you walk a lot, you perspire some, but of course there's a breeze coming off the ocean. In fact, I didn't even hardly turn on the air conditioning in my hotel room.

Swent: Really. That was very nice.

Livermore: Yes.

John Livermore's Office

Swent: Tell me what you've got on your walls, John. You've got a topographic map of Nevada, and you've got the Tonopah Historic Mining Park, and what's that there?

Livermore: Oh, that's the new--that's the Carlin gold trend.

Swent: That's the Carlin trend. And then you've got some beautiful photographs of specimens up here. What are all those?

Livermore: Susan [Lynn] got those. Beautiful mineral specimens.

Swent: Mineral specimens. And Virginia City. That's an old picture.

Livermore: That's my relative. Rice and Livermore, Druggists. Virginia City.

Swent: N.T., Nevada Territory.

Livermore: That was way back in the sixties, before it became a state. He was there for about three years, from about 1863 to '65. He's the one who later went over and was the manager of the Knoxville Mine--that was Charles Livermore. See, he and his brother were in the drug business in San Francisco, and he was sent up here to open a branch office. One of the things, of course, they were selling was mercury for the mines. But I have an ad out of the newspaper. They were selling all kinds of apothecary stuff. After this was taken--all these buildings burned down in the fire, but I'm anxious to go back and see the exact spot. I think I know about where it was. But the original building unfortunately is not there any more.

## Developing a Historic Mine Park in Tonopah

Livermore: Now, one of the projects that I'm interested in is developing a historic park in the old town of Tonopah. One of the main features of Tonopah is all the original buildings and a lot of the machinery from back since 1905 still exist there. It has a fascinating potential to develop as a step into the past, just to see how all these mines looked pretty much at the boom of Tonopah back in 1905. So I've been involved in hiring a new manager for this park and to try to--it's still in the early stages, but to try to get funding for it.

I think it's going to be quite an interesting development because most of the mine plants, of course, have all been destroyed, but this has been preserved. We're right on the edge of Tonopah, actually, the original discovery. And you can see actually the veins where they were digging. The Jim Butler. The veins are still exposed on the surface there.

Swent: The Mizpah vein was one, wasn't it?

Livermore: The Mizpah vein and all those names there.

Swent: I've never been there, but I'm planning to go in June.

Livermore: You should go. Being a prospector, of course, I'm interested in spotting where the actual Jim Butler original discovery was. I don't think anybody knows exactly. It may be covered up now, but to see exactly where the first discovery was. They know about where it was, but--to see all these veins that they were digging. In the early days Butler had these leases working, you know, leases for every hundred feet, and he gave them a whole year, you know, and then they had to dig furiously to take all this high grade because they were all going to run out at the end of the year. Of course, he finally sold out to a company, but they were mining all this high grade. You can see the open cuts.

Swent: You still can?

Livermore: Oh, you see them. And next year is the--maybe you should put it on your calendar--August first is the hundredth anniversary of the discovery. And they're going to have a big celebration.

Swent: The Mining History Association is meeting there in June.

Livermore: You'll see it then, yes. Anyway, this is the big year in Tonopah, so we're trying to get things going.

Transcribed by Shannon Page, Estevan Sifuentes, Gary Varney, Lisa Vasquez, and Mim Eisenberg
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# How to break the impasse over mining reform

High Country News, October 4, 1993

*opinion by* **John Livermore and Glenn Miller**

The debate over mining reform is so polarized that even the most accommodating members of the two camps can agree only that change is coming — not what it should be.

Now, two very different mining reform bills are headed for a showdown in a congressional conference committee. The House bill sponsored by Rep. Nick Rahall, D-W.Va., represents the environmental position. The Senate bill sponsored by Sen. Larry Craig, R-Idaho, represents the mining industry.

They could hardly be farther apart. Nevertheless, we believe a sensible solution is still possible.

Although the move to charge a royalty on public-lands mining has attracted the most attention, a more important issue for miners and environmentalists is abolishing surface patents for mining claims, establishing strong environmental regulations and reclamation standards, and outlining the degree of discretion given to land managers to allow or prohibit mining on any given piece of ground.

Both camps have been tantalizingly close to consensus in the past. But participants in those good-faith dialogues represented organizations and companies unwilling to commit to a compromise that might be labeled a sell-out.

Offering up the following proposal, we speak for ourselves. We are simply two Westerners. We think we have incorporated the best features of both bills bound for the conference committee.

**FINDINGS AND PURPOSE:** Many important new laws begin with findings that state the philosophy and intent that guided Congress and the purpose of the law. For the new mining law these should include preserving incentive by allowing prospectors to search for minerals on public lands that have not been withdrawn from mining; guaranteeing a fair return to the nation for mineral wealth extracted from public lands; and ensuring that environmental values guide mining ventures to protect public resources for future generations.

The Rahall bill has no such section.

The "findings and purpose" section of the Craig bill is essentially a pro-mining platform. It should be rewritten to satisfy backers of the Rahall bill. Although the committee may not be able to write this statement of principles before battling over specific issues, this section of the bill should focus the committee on finding common ground and common values.

**EXPLORATION:** Both bills aim to ensure free access to open public lands for prospecting if it entails a minimal impact, no road building and immediate reclamation. But after a sampling of surface rocks with a pick and geological maps, drilling is required for serious prospecting. Fortunately, exploratory drilling these days can be done with drill rigs mounted on caterpillar treads, which don't require roads or drill pads. That should be the industry standard for exploration.

In principle, exploration should be encouraged rather than encumbered with regulation. An advance notice with a bond to cover any damages should be sufficient for prospecting activities that do not disturb the land, such as exploratory drilling with track-mounted rigs. Prospecting under notice should be subject to clear environmental proscriptions, such as not damaging riparian areas or building side hill roads. But a permit should be required if land will be disturbed by bulldozing a road, for example. In any case, there should be harsh penalties for violations.

Neither bill quite strikes this balance. It could be done with minimal rewriting of the Rahall bill.

**LOCATION OF CLAIMS, FEES AND PATENTS:** We believe Title I of the Rahall bill contains essential reforms that in fact are embraced not only by most environmentalists but supported by many miners as well. The Craig bill ignores many of these essential reforms. Foremost is eliminating the surface patent on mining claims under which miners can acquire public lands for $2.50-to-$5 an acre. The Rahall bill offers a good alternative, establishing an annual rental fee of $5-to-$25 an acre. While a mining claim is active, the renter enjoys rights to the surface and minerals underground. With this protection, legitimate miners have no need for a surface patent and the land remains in public ownership after mining.

The Rahall bill also includes due diligence requirements for developing a claim, with a reasonable write-off against the rental fee for some development and restoration work. Rahall also requires standardized 40-acre claims to conform to the legal subdivisions of existing land surveys and eliminate confusing extralateral rights that allow miners to pursue ore veins beyond their claim boundaries. These are good moves to simplify land-management boundaries. This section of the law is where the mining industry can afford to give the most to make a reform compromise work.

**DEVELOPMENT OF MINES:** Title II of the Rahall bill is where most miners and environmentalists part company. With its detailed list of very strong environmental proscriptions, a strict interpretation of Rahall's bill could practically eliminate all mining in the West. Mining simply cannot be done without some environmental damage.

On the other hand, the Craig bill completely ignores environmental reforms that much of the mining industry is already putting into practice. This could be the toughest, most complicated battle in conference committee. But it doesn't have to be. It's time for the law and the mining industry to catch up to modern environmental concerns.

Compromise is appropriate here. But it must be informed by people who understand the consequences of the language of law. The Rahall bill's blanket prohibitions against damaging riparian areas and adversely affecting groundwater aquifers, for instance, would either stop many major mines entirely or simply be unenforceable. Rahall's environmental and reclamation standards should be simplified to mandate the protection of key public resource values while maintaining the

ability of state and federal agencies to write regulations to fit local conditions.

Some of the requirements of Rahall's Title II, which are particularly onerous to the mining industry, are really not necessary because they are already adequately covered by other laws. These include provisions for public hearings on demand and lengthy timetables for permitting and reviews. Rather than setting up a whole new system for public hearings and review of mining proposals, permitting should be reviewed under appropriate state and federal laws, including the National Environmental Policy Act (NEPA) and the Federal Land Policy and Management Act (FLPMA). These laws already work although they certainly need to be made to work better.

The elements of Rahall's Title II that should be preserved include the requirement for a detailed plan of operations after initial exploration and bonding for reclamation should a mining company fail to carry out its responsibility to restore the land. Rahall's general reclamation requirement to restore the land to its previous productivity or better is good. A mined landscape should be left in a state that blends with the surrounding topography and fits future land-use plans.

Reclamation is only a small part of the cost of mining, and it is key to the future of the land. But the details don't need to be written into the mining law. They should be worked out in regulations at the federal and state level and on the ground.

**UNSUITABILITY AND DISCRETION**: This is the real rub in mining reform. And it will be at the center of the debate. The 1872 Mining Law does not allow the Forest Service or Bureau of Land Management to deny a mining operation, even when strong arguments are presented that mining would destroy important scenic values, wildlife habitat or recreational opportunities.

The mining reform bill should provide some discretion for agencies to limit or prohibit mining in special areas. The mining industry, however, has tagged the Rahall bill a "mine killer" because of the wide latitude it provides for federal land managers to declare virtually any area unsuitable for mining. Rahall also sets up an unrealistic schedule for reviewing all public lands to determine their suitability or unsuitability for mining.

The Craig bill avoids the whole issue.

Fashioning an acceptable compromise on unsuitability and discretion will be very difficult. Although we agree in principle on these issues and on specific areas where mining should or should not be acceptable, we have had a hell of a time agreeing on specific language here.

This is where environmentalists need to recognize the concerns of miners who believe that in some states public pressure will be exerted to remove most of the public land from mining. Miners need to recognize that some places deserve to be protected from mining. In certain very special areas, mining should be excluded. In other areas, mining should be permitted only if the land can be restored to its original condition.

On most public lands, however, mining should be recognized as a valid use, permitted so long as good reclamation is guaranteed.

With public involvement in planning mandated by law, federal land management agencies should be able to decide the highest and best uses for specific tracts of land. But rather than creating a new review and withdrawal procedure especially for mining on public lands, agency discretion should be exercised in the existing land-use planning process. Current law already provides for administrative withdrawals of public lands from mineral entry. Areas of critical environmental concern and research-natural areas can also provide protection by restricting allowable mining activities, although these designations are rarely used for that purpose now.

These withdrawals, protective designations, and other specific restrictions on mining and any other activity can be laid out in the land-use plans prepared by the BLM and Forest Service. But miners need to know before they spend money exploring an area that they will be able to mine if they find ore. If an area is withdrawn after a valid claim has been registered and a plan of operation has been submitted, the miner should be compensated for the lost investment.

**ABANDONED MINE RECLAMATION FUND**: This is a good idea. Modern mining can help clean up the mistakes of the past. Both bills provide for it. Cleaning up polluted streams should be a top priority. This should be an easy point of agreement for the conference committee. But the fund should be funded, as it is in the Rahall bill, and not simply created to await future appropriations, as it is in the Craig bill.

**ROYALTIES**: This is where the conference committee can do what it does best: horse-trade. But the royalty should not be bargained against other reforms. A simple compromise is appropriate here. Pick a number between Craig's 2 percent of net profits and Rahall's 8 percent of gross. The tax should be set at a level that raises revenue without putting mines out of business. The most equitable solution might also be the easiest to manage: a 4-to-6 percent proceeds tax, collected through the Internal Revenue Service rather than a new BLM bureaucracy. The state of Nevada has collected such a tax from mines since the Comstock days. The tax could be based on the income calculation the IRS uses for the mineral depletion allowance. The committee could also consider simply reducing this industry write-off.

There has also been talk of imposing a reclamation fee on all hardrock mines, not just those on public lands which would be affected by a royalty. We think this is a good idea. It would spread the burden more fairly among mines on private and public lands and direct the money where it is most needed — to the ground. ■

| | CURRENT LAW | HOUSE BILL 322 | SENATE BILL 755 |
|---|---|---|---|
| 1. "Right to mine" vs. "Discretion and Unsuitability" | Anyone who discovers a valuable mineral deposit on open public lands has a right to mine it. Agencies can regulate but cannot refuse permission. | Gives wide discretion for agencies to declare areas unsuitable for mining. Permit required for most mining activities. | Essentially preserves the right to mine. Miners must gain approval of a plan of operations. |
| 2. Patenting claims | Allows miners to patent or buy land and minerals for $5 per acre for lode claims and $2.50 per acre for placer claims. | Prohibits patenting federal land. | Miners pay fair market value to patent land. |
| 3. Reclamation | No federal reclamation law. BLM, Forest Service and most states have regulations that require reclamation and bonds to cover some costs. | Reclamation is required to restore land to previous productivity. Bonding required to cover full cost. Creates abandoned minerals mine reclamation fund funded by rental fees and 50 percent of royalties. | Refers to state reclamation laws but sets no federal standards. Creates abandoned hardrock mine reclamation program. Authorizes federal grants to states not to exceed revenues to U.S. Treasury from mining. But does not specify appropriations. |
| 4. Royalty | No royalty. | 8 percent royalty on gross value of minerals taken from public lands. | 2 percent royalty on net proceeds from mining on federal lands. |
| 5. Fees | $35 claim location tee and annual holding fee of $100 per claim. Exemption for small miner holding 10 or fewer claims with active operating permit who does $100 worth of "assessment work" per year per claim. | A minimum of $2.50 per acre annual rental fee gradually rises to $25 per acre after a claim is held for more than 20 years. | $25 location fee and $100 annual holding fee. Holders of fewer than 50 claims can do "assessment" work in lieu of holding fee. Exemption for miners with 10 or fewer claims. |
| 6. Where the money goes | Claim fees and rentals pay for BLM mining law administration costs authorized by Congress; surplus goes to the U.S. Treasury. | Rental fees and 50 percent of royalties go to abandoned mine reclamation fund; 25 percent of royalties paid to states where mines are located and 25 percent to U.S. Treasury. | Two-thirds of claim fees and royalties go to U.S. Treasury, one-third to states in which mines are located. |
| 7. Environmental regulations | No environmental provisions. Other environmental laws apply. | Strong environmental provisions to protect groundwater and to prevent acid mine drainage and other contamination. | Contains no environmental standards. Refers to other existing environmental laws. |

John Livermore is a geologist, miner and co-founder of Public Resource Associates, a natural resources policy group in Reno, Nev. Glenn Miller is a professor of environmental and resource sciences at the University of Nevada, Reno, who has worked on mining issues for 15 years as a member of several environmental groups. Their opinions do not reflect the positions of their organizations. This essay was written with the help of Jon Christensen, Great Basin regional editor of *High Country News*.

# R E S U M E

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A. B. Geology, Stanford University - 1940 - Member Tau Beta Pi

Strategic Minerals Investigation, U. S. Geological Survey, California, Oregon, Arizona - 1940-1941

Basic Magnesium, Inc., Manchester, England and Las Vegas, Nevada - 1941-1942

U. S. Navy (Seabees), New Guinea and Philippine Islands - 1943-1946

El Paso Mines, Inc., Cripple Creek, Colorado 1946-1947

Rutile-Ilmenite-Zircon Division, Humphreys Gold Corporation, Jacksonville, Florida - 1948

Consulting Mining Engineer and Geologist, Nevada, 1949-1951

Chief Engineer and Geologist, Resurrection Mining Company, Leadville, Colorado - 1952-1955

Exploration Geologist, Newmont Mining Corporation, Peru, Turkey, U. S. - 1953-1962

Director of Exploration, Societe des Mines de Zellidja, Bou Beker, Morocco - 1958-1960

General Superintendent, Ruby Hill Mining Company, Eureka, Nevada - 1960-1961

Manager of Exploration, Newmont Mining Corporation of Canada, Ltd., Toronto - 1962-1966

President, Newmont Mining Corporation of Canada, Ltd., Toronto - 1966-1970

Partner, Cordilleran Explorations, Nevada - 1970-1973

Owner, Cordex Exploration Company, Nevada - 1973-1984

Director, San Luis Mining Company, Mexico - 1977-1979

Partner, Pinson Mining Company, Nevada - 1979 -

Partner, Dee Gold Mining Company, Nevada - 1983 -

Director, Rayrock Yellowknife Resources, Inc., Toronto - 1985-1987

Director, Rayrock Mines, Inc., Nevada - 1987 -

Director, Nevada Mining Association - 1984-1987

Co-Founder, Public Resource Foundation - 1982 -

Trustee, California Academy of Sciences - 1984 - 1995

# LIVERMORE BROTHERS' BIOGRAPHIES

by Putnam Livermore

Norman Banks Livermore, Jr., was born in San Francisco on March 27, 1911. He graduated from Stanford in 1933, attended the Harvard Business School in 1934 and 1935, and graduated from the Stanford Business School in 1936. He has always been an outdoor enthusiast. In 1929 he started a pack train in the Sierra Nevada mountains. From 1940 to 1950 he was a member of the board of directors of the Sierra Club at a time when its concentration was on land and wilderness conservation. In 1936, he was on the United States baseball team at the Berlin Olympics. In 1943, he married Virginia Pennoyer.

During World War II he served in naval intelligence. In 1943 he was in the Sicily landing, and in 1944 and 1945 in the island campaigns in the Pacific, attaining the rank of Lieutenant Commander. After the war, from 1947 to 1951 he conducted his own logging business, and then in 1952 became treasurer of Pacific Lumber Company--the largest redwood logging company in the United States. Because of his background in conservation and forestry, he was appointed in 1966 to California Governor Reagan's cabinet as Secretary for Resources in charge of all of California's natural resources and served in that capacity until Reagan's term ended in 1974. In 1972, he was one of five United States delegates to the first United Nations Environmental World Assembly, which was held in Stockholm, Sweden. In 1980, President Reagan appointed him to be head of the Environmental Protection Agency transition team for the new administration.

George Sealy Livermore was born in San Francisco on March 18, 1914. He graduated from Stanford in 1936 and from the Yale Architectural School in 1940, following which he worked with the architectural firm of Arthur Brown, Jr. He entered the army in 1941 and served on General MacArthur's staff in New Caledonia during World War II and rose to the rank of Captain. Upon his return in 1946, he married Janet Clifton and worked for the architectural firms of Weihe, Frick & Kruse and Skidmore, Owings & Merrill, and in 1953 started his own architectural firm. In that same year he was selected as one of the one hundred "News Makers Under Forty" in the Bay Area by *Time-Life* magazine.

In 1964, George was chosen to supervise the design of the restoration of the thirteen Civil War houses on Lafayette Square surrounding the White House in Washington, D.C. He has been very active in civic affairs and has designed residences, churches, schools, and, more recently, remodeling and restoring residences. He has been a trustee of Grace Cathedral and director of the San Francisco Opera and the San Francisco Light Opera.

Putnam Livermore was born on May 29, 1922. He enlisted in the United States Marine Corps in 1943 and served in combat in the Pacific Islands campaigns in 1944 and 1945, being discharged as a captain. He graduated from UC Berkeley in 1946, studied at Yale Law School during 1947 and 1948, and graduated from UC Berkeley's law school (Boalt Hall) in 1949. That same year he joined the law firm of Chickering & Gregory. He has practiced law with this firm since then and has had a broad experience in litigation, labor law, taxation, securities, and, more recently, in real property and natural resource law.

Commencing in 1958, he participated as a volunteer in Republican politics and served as chairman of the San Francisco Republican County Central from 1965 through 1968, vice chairman of the Republican State Central Committee in 1969 and 1970, and chairman of the Republican State Central Committee and Republican National Committeeman from California in 1971 and 1972. Another avocation has been as a conservationist, commencing in 1960 as the first attorney in the western United States for the Nature Conservancy. In 1972 he was one of the five cofounders of the Trust for Public Land. In 1989 he married Pari Caldwell.

Robert was born in San Francisco on June 12, 1926. He enlisted in the army in 1944 and served in the mechanized cavalry in Burma in 1944 and 1945, and served as the bodyguard for General Wedemeyer, Commander of the Burma Area. After the war he entered UC Berkeley in 1945 and was on the National Championship UC varsity eight-oar crew in 1949. He graduated from UC Berkeley in 1949 and from UC Davis in pomology (orchard culture) in 1951.

In 1954 he married Jean Everett. He spent a large part of his life as a farmer and rancher. From 1953 to 1968, he managed large walnut, sheep, and cattle ranches and was on the board of the California State Farm Bureau. From 1975 to 1997 he also engaged in other businesses, including particularly a geothermal waste disposal company and Zendex Corporation, a manufacturer of made-to-order computer boards. He died on November 4, 1997.

# Foreword

The discovery of the Carlin deposit is one of the most significant events in worldwide mining and in the history of Nevada.

Named for a town on the banks of the Humboldt River, the Carlin deposit was overlooked by the '49ers who rushed by, along the Emigrant Trail, on their way to the gold fields in California. Because of the extremely fine grain size of its gold particles, Carlin was missed by the '49ers and by the prospectors that combed the hills of the western United States in the late 1800s. A few gold deposits of what would later be known as the Carlin type were found in the late 1800s and early 1900s, but their significance was not recognized until the Carlin discovery in 1961 and the opening of the Carlin mine in 1965.

Closely following Carlin were discoveries of other deposits along the Carlin trend, a 50-mile long, 5-mile wide belt that now includes more than 20 major deposits.

The Carlin trend has developed into one of the premier gold fields of the world. Known resources are immense, tens of billions of dollars worth of gold, and growing, as new discoveries continue to be made. The deposits of the Carlin trend and other Carlin-type deposits have catapulted Nevada into the lead among gold-producing states and have made the United States a major gold-producing country and net exporter of gold.

Discoveries of Carlin-type deposits have helped to diversify the Nevada economy. Gold mining directly provides thousands of jobs for Nevadans, indirectly provides thousands more, helps build and maintain infrastructure in rural parts of the state, and broadens the tax base for education and other government programs. Highly skilled miners, including heavy equipment operators and mechanics, engineers, and individuals well versed in computer operations, earn the highest average wages of any industry within the state.

Deposits on the Carlin trend have set new standards for gold mining throughout the world. Large-scale mining, heap leaching, and automation at various levels in the mining, milling, and assaying processes have cut overall costs and allowed lower and lower grades of ore to be mined.

This report, written and reviewed by some of the individuals involved, provides a first-hand account of the Carlin discovery, a milestone in the history of Nevada and in the history of mining.

Jonathan G. Price
Director/State Geologist
Nevada Bureau of Mines and Geology

# Introduction

The Carlin mine, owned by Newmont Gold Company and located in the northern part of Eureka County, Nevada, commenced production in April 1965. Ore reserves at the beginning of operations were 11 million tons averaging 0.32 ounces of gold per ton. The Carlin mine had produced a total of 3.2 million ounces of gold when mining was suspended in 1986.

The Carlin gold deposit is hosted within the Silurian-Devonian Roberts Mountains Formation and has a most probable age of between 37 and 14 Ma bracketed by the intrusion of early Oligocene dikes and the extrusion of Miocene volcanics (Kuehn, 1989). The well-bedded Roberts Mountains unit is part of a lower and mid-Paleozoic miogeosynclinal sequence exposed within the Lynn tectonic window. The window is surrounded on three sides by eugeosynclinal rocks of Ordovician, Silurian, and Devonian age which were moved into position along the major Roberts Mountains thrust during the late Paleozoic Antler orogeny.

The mine was the first large development along what is now known as the Carlin trend—a northwesterly trending belt of mineral deposits over 50 miles long and 5 miles wide extending through northern Eureka County into Elko County on the northwest and southeast (fig. 1). Subsequent discoveries and developments along the Carlin trend have led to the identification of over 20 deposits with existing geological resources of gold estimated at approximately 69 million ounces including mineable reserves of 40 million ounces. The Carlin trend has the potential of becoming the largest gold-producing district in North America.

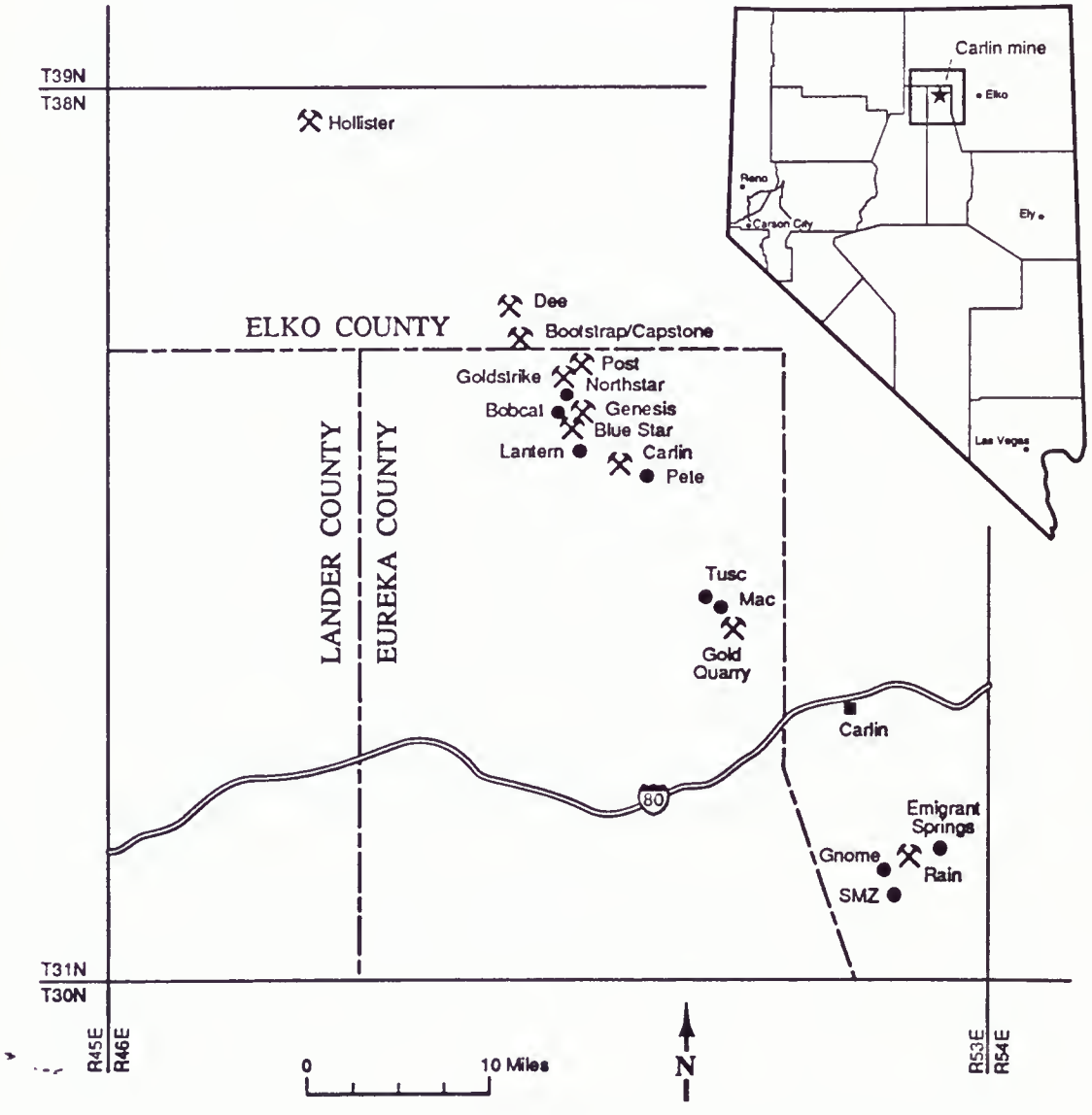


FIGURE 1.—Locations of mines (⚒) and other significant deposits (●) along the Carlin trend, Eureka and Elko Counties, Nevada.

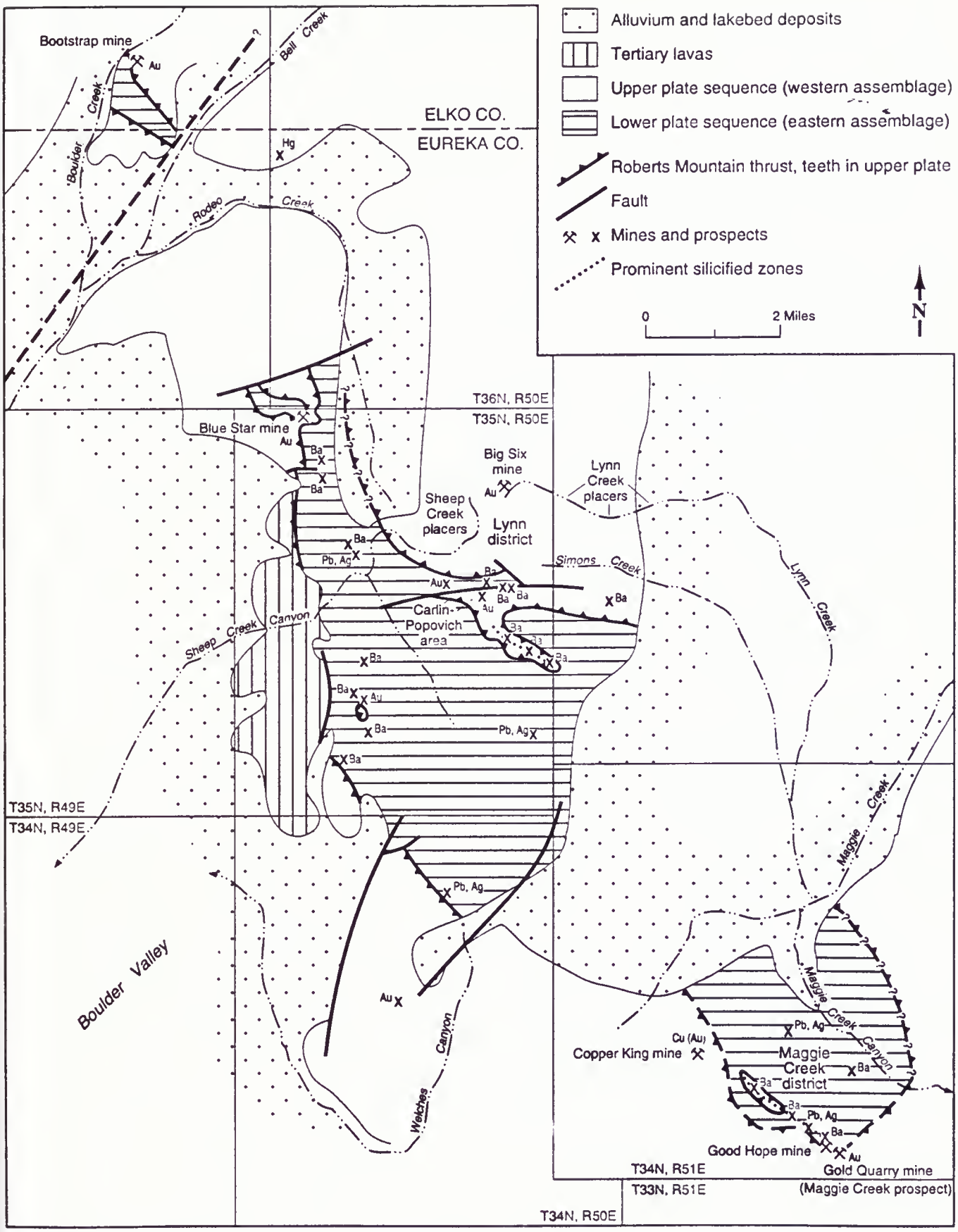


FIGURE 5.—Reconnaissance geological map of the Bootstrap, Lynn, and Carlin windows prepared by J. S. Livermore and J. A. Coope in October 1961 showing the location of active and dormant mines and prospects.

# CARLIN-TYPE GOLD EXPLORATION IN NEVADA SINCE THE NEWMONT DISCOVERY IN 1961

by John S. Livermore

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I feel very privileged to be added to the distinguished group who have received this award since the first recipient Reno Sales in 1954. If my research is correct, the last geologist to be honored was Bill Callahan in 1982. Perhaps the Awards Committee decided it was about time to select a geologist and I became the beneficiary.

Regarding the discovery of the Carlin orebody, it was the culmination of several studies -- one going back as far as 1939 when a U.S. Bureau of Mines engineer, W.O. Vanderberg, recognized in northern Nevada, an unusual type of gold mineralization in sediments where the gold was so fine it would not concentrate in a pan. This plus the study of the Roberts Mountain thrust by Ralph Roberts and conversations with Harry Bishop, manager of the Gold Acres mine pointed Alan Coope and me in the direction of the Lynn Window and eventually the Carlin discovery.

But there has been a great deal written about this discovery and I thought it would be interesting to discuss the evolution of Carlin gold exploration in Nevada since this time and the changes in perception of this unique type mineralization.

The method used by Alan and me in following up on Roberts' work was to map geologically the Roberts Mountain thrust and conduct geochemical sampling of favorable outcrops and float. Alan was highly experienced in geochemical exploration as he had graduated from the Royal School of Mines in London studying under John S. Webb, one of the pioneers of geochemistry as applied to mineral exploration. We considered using pathfinder elements, but finally concentrated on gold analyses alone even though the sensitivity of fire assays used at that

time was only about 1/2 part per million.

According to the spatial relationship of mineralization to the Roberts Mountain thrust pointed out by Ralph Roberts, we were looking for mineralization within the thrust itself. Our models were the known Gold Acres and Getchell mines which contained reserves in the order of 1-2 million tons. These were not of substantial size but I had hoped we might find more than one of these tributary to a mill which would justify an operation for our employer, Newmont Mining Corp. What we ended up with was the type of deposit we were looking for -- an open pittable deposit of micron gold which the old timers had missed because the gold was not pannable. But never in our wildest dreams did we think there was a chance to find a body containing 11,000,000 tons at 0.30 ounces of gold per ton. The deposit was not in the thrust proper but in a favorable horizon of Roberts Mountain siltstone below the thrust. This is the first example of how a model should not be followed blindly.

Newmont was successful in keeping this discovery quiet for some time. After a considerable amount of drilling had been done, a rumor circulated around that they had discovered a large low grade ore body around .05 to .06 oz/ton, which of course would not have been economic at $35/oz. gold. The company, for obvious reasons, did not discourage the rumor.

When, however, the true results came out there was a lot of feverish activity. Because of this new type of so-called "invisible gold," which could have been missed by the old timers, the thought was that other deposits would be discovered very soon. The Carlin deposit and other smaller deposits, Bootstrap, Blue Star and Gold Quarry, were in windows where the Lower Plate Roberts Mountain formation below the thrust had been exposed by erosion. This then became the new model and an active U.S.Geological Survey (USGS) mapping program soon identified a number of other windows where the Roberts Mountain formation was exposed. There was intense exploration carried out at these sites and gold mineralization was encountered, but only

one, the Cortez deposit, turned out to be a commercial ore body. Cortez was actually found indirectly by an experimental geochemical program conducted in 1964 by R.L. Erickson and A.P. Marranzino of the USGS in an area which had been a producer of silver and base metals. They ran a series of elements by spectrographic analyses and obtained, in one area, a strong anomaly in arsenic, antimony and mercury. Gold was not run because the analytical method was not sensitive enough. This was an early illustration of how geochemistry could indicate areas of alteration and possible mineralization which could point to silver and base metal deposits characteristic of the district. Two years later they decided to analyze some of the outcrops in the anomalous area for gold. One sample ran 3.5 oz/ton. This turned out to be the Cortez ore body – similar to Carlin in grade -- 0.30 oz/ton but only 3,000,000 tons. This could have been found by an experienced prospector who would have recognized the jasperoid outcrops and float chips as being worth sampling for gold.

Why were no more discoveries made? By looking only for windows and concentrating on the Roberts Mountain formation, exploration companies seemed to be taking too narrow an approach in this search. Also they seemed to think the chance of finding new outcropping deposits was limited, so they concentrated their search on hidden bodies. There was a great interest in arsenic as an indicator of gold, and a great many arsenic anomalies without gold were drilled without success. There is always an association of arsenic with gold but unfortunately the reverse is not true. When the mercury sniffer was developed there were great hopes for this method, and mercury in soil gas was tested, but no discoveries resulted. An airborne program was conducted by the US Geological Survey to test for mercury vapor in the atmosphere. Unfortunately, the conclusion was that practically all of northern Nevada is a mercury anomaly.

After the Cortez discovery in 1966 there was a second flurry of activity. And in 1968 R.W. Merwin, in the U.S. Bureau of Mines: Technical Progress Report No. 1", discussed the

Bureau's work in treating carbonaceous ore and made the prediction that there could be as much as 100,000,000 tons of deep carbonaceous ore in Nevada. This caused a lot of excitement and many deep holes were drilled to intersect the Roberts Mountain thrust at depths up to 1,000 feet, but nothing was found. Interestingly, this prediction, which seemed rather fanciful at the time, looks quite realistic today.

But interest gradually waned in the late 60's and early 70's. The feeling was that even though the original Carlin deposit was profitable at $35/oz. gold, this was probably an exception. The average deposits would be too small for major mining companies. Even Newmont practically stopped gold exploration in Nevada. The emphasis was for porphyry copper and molybdenum deposits.

Everyone believed that the $35 gold was unrealistic and that it would eventually have to increase in price to recognize its intrinsic value. I was of this belief and felt strongly that more Carlin deposits could be found which would be profitable at a higher price.

From 1962 to 1970, I had been with Newmont in Canada, but my job had become too administrative, and I wanted to get back into more field work. So I convinced four Canadian companies headed by Rayrock Mines, Ltd. to back me on an exploration program for gold in Nevada.

In 1970, I teamed up with Pete Galli who also was interested in going off on his own after many years with Union Carbide. We formed Cordilleran Explorations and were guaranteed a $1,000,000 budget over a three year period. There were only one or two companies exploring for gold at this time, and we practically had the whole state of Nevada to ourselves.

We believed more outcropping orebodies could be found and decided to return to the methods of surface prospecting used successfully in 1961. Our plan was to conduct primary reconnaissance mainly in known mineralized areas looking for the following:

1. Favorable calcareous sedimentary rocks.
2. Evidence of pervasive hydrothermal silicification as opposed to quartz veining.
3. Rusty color indicating oxidization of pyrite which is always associated with this mineralization.
4. Proximity to an intrusive and/or presence of altered dikes indicating structural preparation.

We decided the work would not be confined to the classic "window" model which had caused the Getchell trend to be overlooked. This trend later produced the Pinson, Preble, Rabbit Creek and Chimney Creek ore bodies and became second in importance to the Carlin trend.

My experience in Canada, plus the time spent with Alan in 1961, convinced me of the importance of having people with a prospecting instinct carrying out the initial field work. This was considered outdated in the United States. The work would be done by a practical prospector or a geologist who had a feel for this. There are many fine geologists who are simply not good prospectors. The initial identification of mineralization would be followed up by a thorough geological evaluation. In our organization we all did a certain amount of prospecting.

In Canada, we used prospectors extensively and found them to be very effective if knowledgeable about a particular area or type of mineralization. You could not force a good prospector to cover an area he was not instinctively attracted to. If shown a general area, he would look round at the rocks and degree of alteration and if his nose for ore or ESP based on previous experience clicked, he would spend the whole summer prospecting the area. If not, he would have to be shown another one. When a prospector in Canada located a showing some would say it was mostly luck but if he came up with four or five discoveries the skeptics would have to admit there was more to it than just luck.

The best thing Pete Galli and I did early in the program was to hire Whit DeLaMare

(known as Dee). He was a graduate of the Mackay School of Mines in mining engineering and had held operating positions at several mines plus managed his own company extracting iron ore for shipment to Japan. When the orebody played out he was living in Winnemucca and at loose ends. He had developed an interest in geology and we discussed with him the idea of joining Cordilleran with a salary plus discovery bonus. It was unusual that a man almost 60 years of age would decide at this time in his life to spend his time tramping the hills of Nevada.

We did not require any reports from him. We wanted him to spend most of his time in the field when he was not reading literature or studying aerial photographs for prospecting ideas. His efforts resulted first in the discovery of the Preble deposit in 1971 in an area where no gold had been recognized. He became interested in the area because he saw arsenic oxide coloration. Sampling of float chips led to the discovery. He also found the Dee deposit (named after him) in an area that had been traversed by a number of geologists one mile from a known deposit. The obvious bold outcrops had been sampled many times with negative results, however he found a small area of a few square feet where the bedrock was barely exposed. This small exposure had the characteristics of silicification and a certain rusty color which caught his eye. It ran almost an ounce in gold.

In 1976 a prospector made a subsequent virgin surface discovery at Alligator Ridge in an area that had been extensively geochemed by a major company. At about the same time, FMC Corporation was conducting a search for antimony to utilize in fire retardant paint. They did a soil survey of an area in the Independence range, and as an afterthought, ran the samples for gold. This resulted in the Jerritt Canyon orebody. Then when the price of gold rose and exploration rapidly increased in the 80's there was a string of discoveries of virgin outcropping orebodies -- Gold Bar, Chimney Creek, Bald Mountain, Tonkin, Rain, Lone Tree, Secret Pass. All of these deposits would have been interesting even at $35/oz, although possibly not economic.

We found that having an experienced prospector going through the country sampling only the best looking rocks was more effective than an arbitrary grid sampling of soil by an inexperienced person. Also soil was not as effective as float chips because of the amount of transported wind blown silt in the soil throughout most of Nevada. This taking of a highly biased sample was not according to the book but worked with an experienced person. What we wanted to do initially was identify the presence of gold. Accurate sampling came later.

There were many factors that Dee and all of us in Cordilleran (later Cordex) used in evaluating areas. The most important thing was to look for hydrothermal silicification of favorable calcareous sediments. This hydrothermal silica is sometimes not easy to distinguish from diagenetic silica or highly siliceous siltstone. It is usually easy to recognize a completely silicified limestone (jasperoid) although even here the texture of the rocks can be confusing. A large bold outcrop at the Bootstrap mine was mapped as a quartzite, but it is in fact, a silicified massive sugary-textured limestone. Silicification of a calcareous siltstone is even more difficult to recognize because the rocks will often scratch as readily as the original. It will have a slightly harsher feel and a texture which can be recognized with experience. Of course, if a calcareous siltstone horizon can be followed into an area where the calcite has been removed by silicification, this becomes a very favorable zone for Carlin gold mineralization.

Another factor is the color of the silicified rock - particularly jasperoid. T.G. Lovering, in his 1972 USGS Professional Paper 710 - "Jasperoid in the U.S." - pointed out the importance of color in evaluating jasperoids. He was looking more at the base metal environment but it applies as well for Carlin mineralization. A red brown Iron Oxide is more favorable than yellowish brown. At the Pinson mine a distinctive wine colored jasperoid always indicated high grade.

When a prospector came in with an interesting gold assay this was followed up by a

geological evaluation. The first thing to determine was whether the sample represented Carlin type mineralization. This could often be recognized in a single sample simply by the type of rock, lack of silver values, and the presence of pervasive silicification rather than quartz veining.

Any indication of Carlin type mineralization deserves a serious follow up even if the initial values are very low. Often as part of the initial geological evaluation a few reconnaissance drill holes are justified. Early holes are helpful in stratigraphic information and in determining the metallurgical amenability of the property, which is often overlooked in an early evaluation. Samples of drill cuttings would indicate:

(1) depth of oxidation giving the potential for leachable ore;

(2) amenability to heap leaching by comparing recovery of as-is cuttings to ground cuttings;

(3) nature of primary mineralization -- sulfide alone or carbonaceous. In the case of carbon, whether it is organic carbon requiring oxidation or graphitic carbon (e.g. in the contact aureole of an intrusive) which is often leachable.

Also we would be looking for verification of Carlin mineralization by it characteristics of very uniform dissemination with none of the high gold spikes found in other gold deposits and a very sharp cutoff in values. If these factors were positive, a large drilling program would be justified.

A change in the original model had to be made as to the age of the favorable rocks. The first concept was that the deposits had to be in the Roberts Mountain formation. Later they were found in other Lower Paleozoic rocks. For quite a while the general idea was that the Pennsylvanian rocks were too high in the section. We had prospected the area north of the Pinson and Getchell mines, but half-heartedly because they were the "wrong rocks." Then a geologist found an outcrop of jasperoid on a tiny hill which turned out to be the Chimney Creek

deposit in the Pennsylvanian, one of the most profitable orebodies of all.

I am convinced that Carlin deposits can even occur in rocks as young as the Tertiary. We discovered a calcareous siltstone bed of Tertiary age near Parker, Arizona which had disseminated gold with all the right characteristics but was not economic.

And the mineralization does not have to even be confined to sediments. Cordex Exploration is developing a Carlin deposit near Beatty in Tertiary volcaniclastic sediments and ash flow tuffs. The introduction of carbonate as a result of propylitic alteration created a favorable host. Also, I consider the mineralized bodies in intrusives such as Getchell, Stibnite, and the Mother Lode near Beatty to be Carlin type. They occur where an intrusive is in contact with limestone and through endomorphism retain a content of carbonate. What simply is required are host rocks containing disseminated carbonate.

A factor which greatly increased the effectiveness of exploration in the 70's and 80's was very low cost rotary drilling, which allowed its use in the very early stages of exploration. It had been proven in uranium exploration, particularly in Wyoming, that costs as low as $2/ft. could be obtained. But for metal exploration most mining companies -- mainly exploring for copper and molybdenum porphyry deposits -- used mostly core drills because of more accurate geological information and greater depth potential. The result was a test of a Carlin type showing that might involve only 2 to 3 holes because of the costs involved.

A proper test of an identified Carlin showing should involve many more holes before walking away from the property. At the Pinson mine, for example, two core holes had been drilled through low grade mineralization and the project dropped. Our geological mapping suggested there could be extensions of this mineralization. So we laid out a program of 20 holes. The first holes were marginal at $35 gold and the driller was sent home, but when the final assays came in we found the 17th hole had cut what became the Pinson "A" ore body which

suboutcropped under only 20 feet of alluvium and was missed by an earlier operator. Another example of this was the Sleeper deposit (a Hot Springs occurrence) which was found after 30 marginal holes had been drilled.

Also, it was found that examination of the drill cuttings gave almost as much information as core with the exception of fragmental textures which could not be well identified.

The early drilling was all conventional drilling because reverse circulation, although known at the time, was four or five times as costly. Later with larger drills and better down the hole hammers, the rates of penetration were increased substantially, thus reducing costs to the point where the latter method is now used exclusively. Conventional drilling produced satisfactory samples above the water table in the oxide zone but with water flows, and particularly in the sulfide zone, contamination made the samples very unreliable. The pyrite would have a tendency to segregate and distort the grade. Reverse circulation improved the quality of the sample but there still can be contamination with heavy flows of water.

One annoyance in drilling was to be limited to vertical holes where often in testing steep structures angle holes are needed. Andy Wallace and I expressed this frustration often to Lew Eklund, owner of Eklund Drilling Company in Elko, Nevada. He discussed it with Drill Systems, a drill manufacturer in Canada, who came up with a prototype angle drill, which was gradually improved and became very effective.

The next step, also developed by Eklund, was to mount the drill on track. This permitted drilling on slopes up to 25-30 degrees without requiring a road. The reduced environmental damage was a very welcome improvement.

Geophysics was one method which did not seem to be effective in gold exploration in the Basin & Range. The physical properties of Carlin orebodies are not distinctively different from surrounding rocks. The electrical methods were pretty useless because the broken nature of the

rocks produced abundant anomalies from water-soaked fractures. VLF was somewhat effective in tracing known structures a certain distance. And magnetics had use in identifying intrusives, structures, and as an aid in geological mapping.

Induced polarization was not too useful because the prospective rocks often had ubiquitous syngenetic pyrite as well as the pyrite associated with gold. Also, the carbon usually associated with calcareous siltstone could be a problem, particularly when in graphitic form. It sometimes has been useful in measuring variations in the depth of oxidation as a negative anomaly overlying conductive unoxidized carbon and/or sulfides. This could be indicating deeper oxidation over a mineralized structure.

How will the new orebodies in Nevada be found? It is surprising how many virgin surface showings have been located in Nevada in the last 15 years. Often the discovery was a very small outcrop in an area which had been well prospected, and included extensive geochemical sampling, e.g., Dee, Alligator Ridge, Chimney Creek. There probably are more of these to be found.

But during the exploration boom of the 80's, the surface has been pretty well prospected, so the challenge is to find covered deposits, particularly in the extensive pediment areas with shallow alluvium. Several of these have been discovered, e.g., Pinson, Marigold and Rabbit Creek by extrapolation of known occurrences.

As Ralph Roberts' research of the Roberts Mountain thrust led to the original Carlin, we need additional basic research to direct us to methods for finding the deep orebodies of the future.

Geochemical sampling has developed greatly since 1961 due to increased sensitivity of analyses where true background values for gold can now be obtained. Research by the US Geological Survey continues in soil gas determination with interest, according to Howard

McCarthy, now seeming to center on measuring hydrocarbons emanating from a hidden orebody.

Some biogeochemical sampling has also been tried by the USGS with some success. Sagebrush over known gold deposits often seems to contain anomalous amounts of gold. However, it has not been possible to translate this into new areas with enough confidence to justify drilling anomalies.

Water analysis may have some promise as there does appear to be detectable dispersions of gold and pathfinder elements from mineralized areas which can be detected in the groundwater. But more work needs to be done on this.

It is surprising that with all the geological mapping completed in Nevada, there is still not a thorough understanding of Lower Paleozoic units which are so favorable for Carlin deposits. Professor Stan Finney of Long Beach State has been quietly working with graptolites and conodonts for several years and has come up with some very interesting breakdowns of units which were considered unmappable. He has been able to trace calcareous rock in Upper Plate units which had not previously been considered prospective.

Some new geophysical methods have been useful, such as Controlled Source Audio-frequency Magnetotellurics (CSAMT), which can distinguish lithologies and identify certain deep structures. Resistivity can in some cases distinguish areas of silicification, and gravity has been useful on a regional basis to indicate overburden depths.

Drilling was such a cheap reconnaissance tool for shallow ore that indirect geophysical methods became secondary. But now a method must be developed to provide targets for the expensive ($100,000 or more) core holes now required.

Down hole seismic probing of a series of drill holes with analysis by tomography is a new method being used in petroleum and could have some benefit but the cost has often been considered too high. The type of work the USGS did on the Getchell trend combining three

frequencies of airborne electromagnetics (EM), magnetics, and gravity may indicate future trends. A computer analysis of this mass of data plus ground CSAMT has produced anomalies which are now being tested by Pinson Mining Co.

Remote sensing is gradually coming into its own. Ability to detect areas of clay alteration, iron oxide, and silicification by multispectral and hyperspectral imagery is improving.

The science of mining geophysics has been badly neglected since the active years of the 50's and 60's. Many universities have dropped their programs. To counter this a Chair in exploration geophysics has been created at the University of Nevada, Mackay School of Mines with the hope of establishing a research center to develop new methods of identifying targets for exploration.

There is still a great deal to be learned about the basic nature of Carlin mineralization such as the relationship of the various types of carbon to gold mineralization and details of the stratigraphy in the Carlin trend have not been completely worked out. An effort to begin solving some of these problems will be made by the establishment of the Ralph Roberts Center for Research in Economic Geology at the Mackay School of Mines. This program is being funded by a group of mining companies and will concentrate on the geology, geochemistry and genesis of Carlin-type deposits.

Evidence of the presence of more deep-seated deposits is the recent announcement of FirstMiss's Turquoise Ridge and Newmont's High Desert deposits, each with reserves of several million ounces. They both start at depths of 1500 feet. and the ultimate depths of this type of mineralization is still unknown.

Why Nevada has been blessed with this tremendous concentration of unique gold deposits is unknown. The only other deposits of this type in the world are possibly in China. Nevada, with 60% of U.S. and 11% of world production, should have been named the Gold State rather

than the Silver State after the Comstock Lode. I am convinced it will maintain its leading position in gold production for some time.

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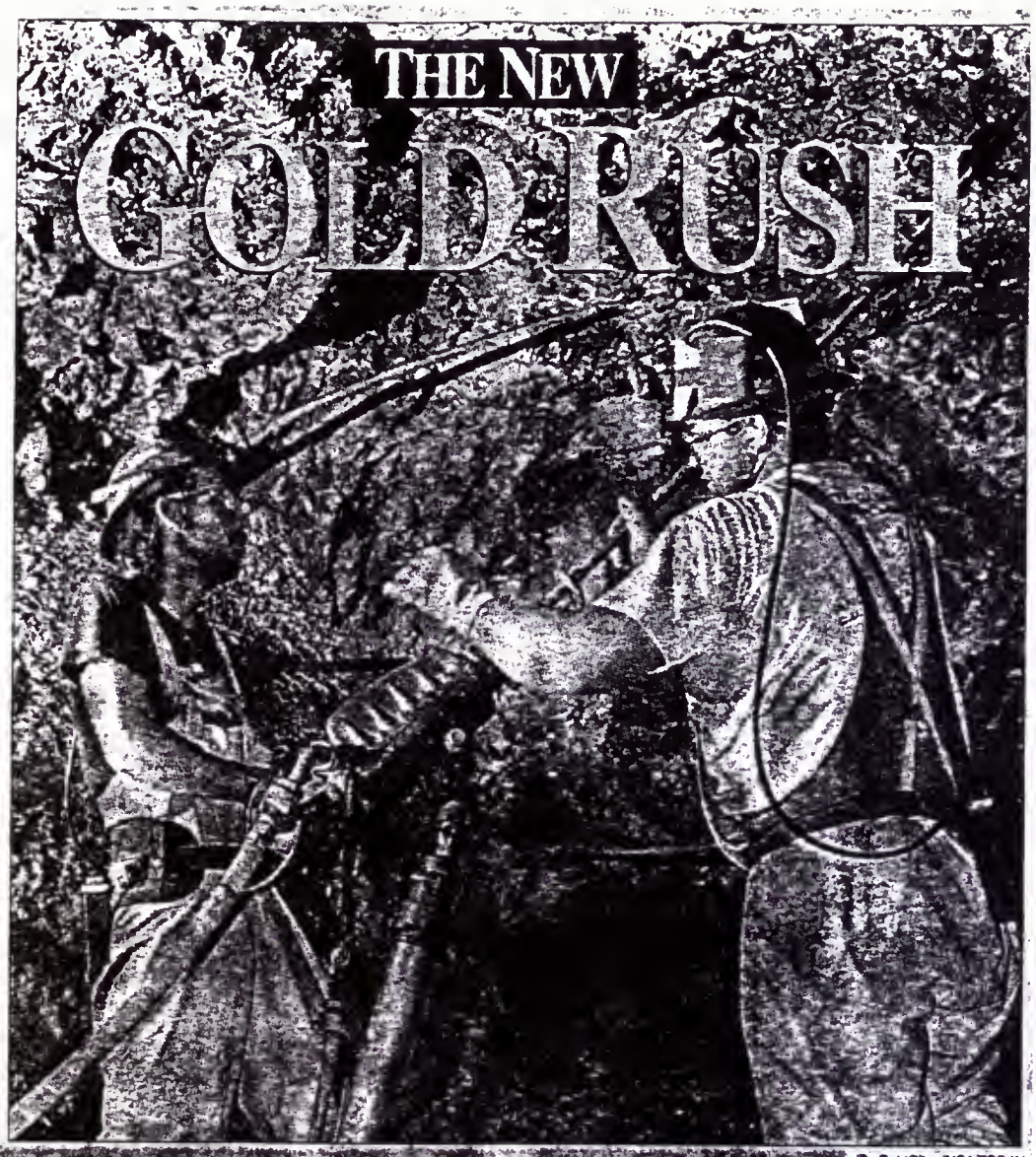
USA Today,
July 21, 1997

# THE NEW GOLD RUSH



By Bob Riha, USA TODAY

# Invisible specks of gold add up to $18 billion so far

By Dennis Cauchon
USA TODAY

COVER STORY

MULE CANYON MINE, Nevada — Bulldozers have pushed aside sagebrush. Giant mechanical scrapers have cleared away top soil. Explosives, stuffed into 100 holes, each 35 feet deep, are ready to blast sedimentary debris that contains the geological secret fueling the largest gold rush in U.S. history, under way in northern Nevada.

"Invisible gold" is what the miners call it. It comes in such tiny specks that it can't be seen with the naked eye or even an average microscope. Old-time prospectors, who scoured this beautifully desolate land for a century, missed their fortunes because the gold floated away like dust on the water in their gold pans.

But now, its discovery in northern Nevada is revolutionizing gold mining worldwide and creating the fourth major gold boom in this country's history.

Almost unnoticed outside the mining industry, the United States has gone from producing negligible amounts of gold in 1980 to ranking second in the world, behind South Africa. Nevada alone produced 10% of the world's gold last year and, by itself, ranks third in world gold production. California, the next most productive state, produced 1%.

Nevada is the cheapest place in the world to mine gold, so the falling price of gold only increases the state's importance in world production. Mines shut down in other countries, unable to make a profit at $320 an ounce, but Nevada's mines stay in operation. Since 1990, 45 million ounces of gold, worth $18 billion, have been mined in the state.

Nevada has become to gold what Saudi Arabia is to oil. Even the most conservative estimates indicate that current production levels can be sustained for 15 years if the price of gold

Please see COVER STORY next page ▶

# College-educated prospector uses computers, money

Continued from 1A

stays at or above $300 an ounce. New, large discoveries continue to be made.

"Most people working double shifts in the casinos in Reno have no idea that there's a massive gold mining boom just a few hours away," says Nevada state geologist Jonathan Price.

Nevada's gold fortune resides in what geologists call the Carlin Trend, a geologic fluke unlike any gold belt in the world. As formations go, it is tiny: only 38 miles long and seldom more than a mile wide. Geologists disagree on why it exists, but the invisible gold is plentiful, at least 85 million ounces. Most is near the surface, where it can be mined for less than $250 an ounce — sometimes a lot less.

COVER STORY

The Carlin Trend continues to amaze geologists as a seemingly bottomless pit of gold. John Livermore, the geologist who discovered it, first thought gold might run 300 feet deep. But mining has exceeded 1,000 feet and the ore only gets richer.

Newmont Mining Corp. is still mining the trend near Livermore's original 1961 discovery. Last September, Barrick Gold of Toronto opened a $180 million underground mine that will pull 400,000 ounces a year from the Carlin Trend.

Discovery of the Carlin Trend prompted exploration elsewhere in Nevada, and three other major gold areas were found: the Battle Mountain Trend, where Mule Canyon Mine is located, the Getchell Trend and the Independence Range. They produce mostly invisible gold, too, but their geology is somewhat different from, and not as rich as, the Carlin Trend. The Carlin Trend still produces more than half Nevada's Gold.

Today, Nevada has 30 operating gold mines. The industry employs 14,400 people directly in towns such as Winnemucca, Battle Mountain and Elko. The population of Elko, heart of the gold industry, has boomed from 8,750 in 1980 to 43,000 today.

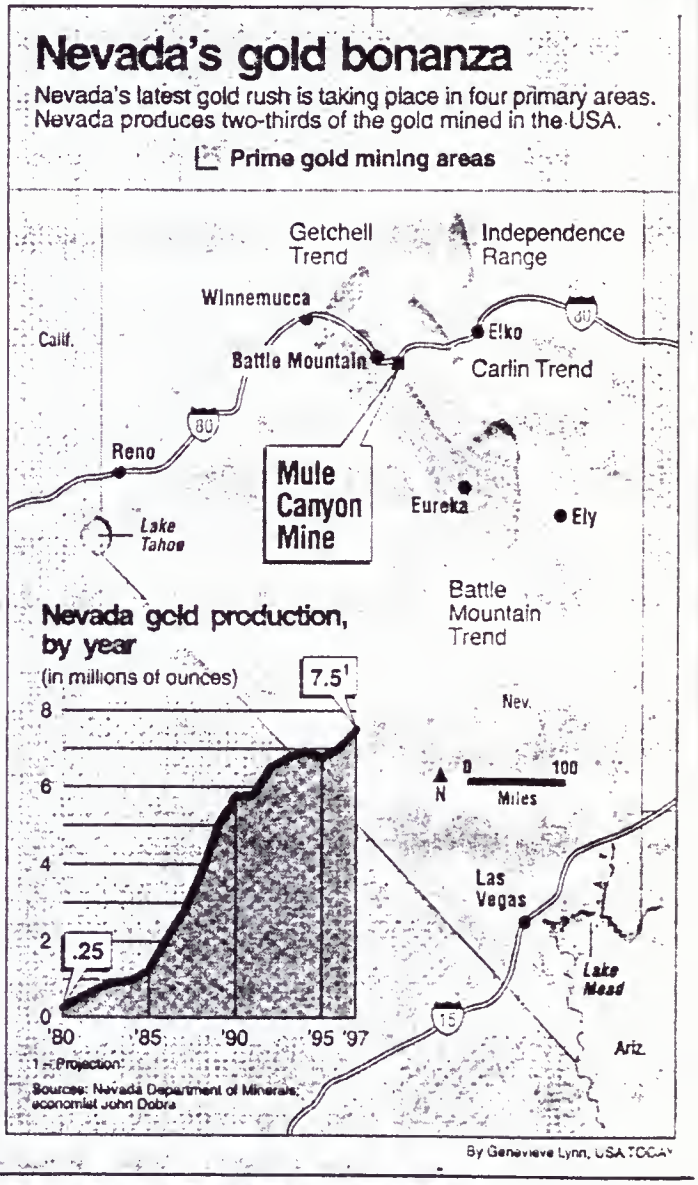
To attract workers to this area three hours from the nearest shopping mall, the big mining companies subsidize housing construction, sponsor social events and pay high wages. Average annual income in the Nevada gold mining industry was $47,500 in 1996, well above the state average of $26,000.

Most mines operate 24 hours a day, two shifts a day, 365 days a year. The philosophy is get it fast and get it all. Most "invisible gold" can be recovered the traditional way: grinding the rock and treating it with cyanide and carbon to extract the gold. But Newmont Mining, owner of Mule Canyon Mine, among others, also uses biotechnology to retrieve the hardest-to-get-gold, trapped inside hard-to-process sulfide ore in amounts as small as one ounce of gold for every 33 tons of rock. Basically, bacteria is leached over the ore. The bacteria separates gold from other minerals.

Environmental regulations have softened the scarring that strip-mining does to the land. When the mines are closed, the companies are required to return the topsoil and contour the land in an aesthetically acceptable way.

## Nevada's gold bonanza

Nevada's latest gold rush is taking place in four primary areas. Nevada produces two-thirds of the gold mined in the USA.




By Genevieve Lynn, USA TODAY

## Technology a key to gold rush

The gold boom was made possible by technological advances that make it economical to retrieve invisible gold, by a controversial 1872 law that basically gives government land to anyone who can prove a valuable discovery and by President Richard Nixon's decision in 1972 to let the price of gold rise from $35 an ounce.

Invisible gold has made the old-timer's gold pan nearly useless. Today's prospector is more likely to have a master's degree from a top mining school and use computer models. The prospector's most important tools now are knowledge and money. Especially money.

A basic rock analysis costs about $20 per sample, and 500 to 2,000 samples are needed to collect enough hints that a site might possibly, if everything goes right, be valuable. Then, the prospector stakes a claim on the land, usually federal land, at a cost of $100 per year per claim. It takes 30 to 100 claims to get an area large enough to make a discovery worthwhile.

In short, it takes $15,000 to $30,000 for a prospector to put together a package that might interest a mining company enough to pay for further exploration. And that package, if it's an excellent one, has less than a one in 100 chance of turning up gold worth mining.

Consider David Shaddrick, 55, a respected independent prospector who once was exploration manager for a large company. Did he find something last year? "No." The year before? "No." When was his last discovery? "1983," he says. "And that's a good record. The vast majority go their whole lives without discovering anything."

But the payoff can be spectacular.

## A gold-made millionaire

Pat Cavanaugh, who has a master's degree in economic geology from the University of Montana, became a millionaire after discovering the South Pipeline field in the Battle Mountain Trend. (Trend is a geologist's term to describe a broad gold-bearing area.) Cavanaugh's discovery has proven reserves of at least 2.6 million ounces, worth about $1 billion.

His road to discovery dates to 1986, when he questioned a number in a complicated formula. The U.S. Geologic Survey showed the South Pipeline property consisted of gravel 3,000 to 12,000 feet deep. Cavanaugh suspected it was only 200 feet deep, and could easily be cleared away in the pursuit of gold. Cavanaugh and a partner spent $15,000 staking the claim on federal land and $5,000 analyzing samples.

Twenty-one companies turned the idea down. "We saved some of the letters from their geologists saying it just wasn't possible," he says.

The twenty-second company was Royal Gold. The geologist was an an old buddy of Cavanaugh's. He saw that a nearby gravel mine didn't go very deep, so perhaps Cavanaugh's theory was right.

Royal Gold paid $15,000 to study the geophysics — set off dynamite and map the sound waves. The seismic study put the gravel at 700 feet deep. Royal Gold spent another $40,000 to drill for an exact location of the bedrock under the gravel. The results were even better. The gravel was only 300-400 feet deep. Royal Gold spent another $350,000 to drill 18, 700-foot holes and see if the rock contained invisible gold. It did.

Still, more money and time was needed: another $2 million to pay for several more rounds of exploratory drilling, four years of litigation to secure property rights and finally locating a big mining company to build a mine.

How long can prospectors come up with gold? One clue: Elko doesn't have a shopping mall yet. No company has been willing to make the long-term investment in a boom-bust gold economy. Ghost towns are a tourist attraction in Nevada, too.

So far, though, gold fever shows no sign of letting up. The state geologist's office has sold 607 copies since last May of a 63-page, $4 booklet that an amateur can use to stake a gold claim. The Nevada Bureau of Mines and Geology Web site (www.nbmg.unr.edu) is getting thousands of hits every day.

There's still lots of gold in Nevada's hills. But unlike the good old days in the 1960s, hundreds of people are looking for it.

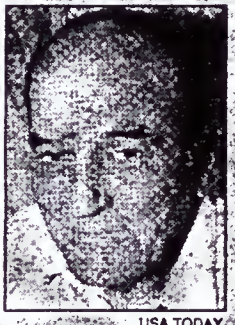
# Gold rush got started with a look beyond the obvious

By Dennis Cauchon
USA TODAY

RENO, Nev. — The Nevada gold rush began as an idea in the head of a legendary 6-foot-5 Stanford-educated geologist named John Livermore.

In 1961, he discovered the richest gold field in North America, near Carlin, Nev., on property where an old-time prospector lived in a shack and spent his days unsuccessfully panning for gold.

At the time, mining companies thought Nevada had been stripped of gold by the skillful old-time prospectors whom contemporary geologists still hold in great esteem for their insightful readings and precise descriptions of the land.



USA TODAY

**Livermore:** 'Babe Ruth' of gold mining

In 1961, Livermore was managing an old silver mine in Eureka, Nev., for Newmont Mining, but he kept thinking about a couple paragraphs in an obscure 1939 government report. A government mining engineer had noted that he'd found some rocks that looked worthless but actually had gold in them. You couldn't tell by looking. Only a high-heat fire assay test could distinguish between gold ore and waste.

Livermore didn't know where to look for this gold until he drove four hours to have drinks with Ralph Roberts of the U.S. Geologic Survey at a hotel bar in Ely, Nev. "Ralph's work gave me an outline of where to prospect instead of just walking all over the place," Livermore says.

Together, the two geologists are considered the fathers of the modern day gold rush.

Newmont Mining rented a bulldozer, and Livermore packed 5-pound rock samples into burlap bags. He tossed them into the back of his pickup truck and drove 50 miles to the nearest fire assay lab. When the results revealed they'd found gold, Livermore and his colleagues threw some trespassers off the property.

"We had no idea about the size and scope of what we'd found," Livermore says. "We were hoping for maybe a few hundred thousand ounces." So far, more than 85 million ounces have been found.

And the man who started it all is still at it. Livermore, now 79, has been involved in five major gold discoveries — a Babe Ruth-like record in gold mining. He just returned from Honduras, where he's getting a small (150,000 ounces) gold mine going. He never married. "Too independent, I guess." On the wall of his small office near Reno's airport are color photos of rocks containing hidden gold, a map of Nevada and a calendar from 1988.

"I once asked my former boss at Newmont why he was still out there prospecting in his seventies," Livermore says. "He said, 'I want just one more, John. Just one more.' Ahh, yes, I know the feeling exactly."

San Francisco Chronicle

PENINSULA

AND THE BAY AREA

TUESDAY, NOVEMBER 25, 1997

BAY AREA FOCUS

# Treasure of a Hiking Trail

PHOTOS BY VINCE MAGGIORA/THE CHRONICLE

Hiker Guy Kay looked out at the recently acquired 588-acre Palisades Trail out of Calistoga

# Robert Louis Stevenson State Park grows with a classic 588-acre addition

*By Jim Doyle*
*Chronicle Staff Writer*

Some folks say the Palisades cliffs above Napa Valley are what Robert Louis Stevenson had in mind when he described the setting of his greatest classic, "Treasure Island."

Guy Kay on one of the trails recently transferred to R.L. Stevenson State Park

The Scottish author spent a few months in an abandoned mining camp here in 1880 while he worked on the novel. And it's easy to imagine this wild and rugged terrain as the backdrop for Jim Hawkins' harrowing island adventures with the pirate Long John Silver.

Soon, a ridgetop trail will be opened to allow hikers to explore the Palisades — with their rocky cliffs where peregrine falcons live, steep canyons and dazzling vistas of Napa vineyards.

State park surveyors have begun marking the new hiking trail as part of one of the state's most important land acquisitions in years: the recent transfer of the 588-acre Palisades to Robert Louis Stevenson State Park.

The land deal caps three decades of work by Bay Area conservationists to preserve the Palisades from the encroaching development of luxury homes.

It was made possible by the Napa County Land Trust and the Norman B. Livermore family, which donated some of its land on the southeastern flank of Mount St. Helena.

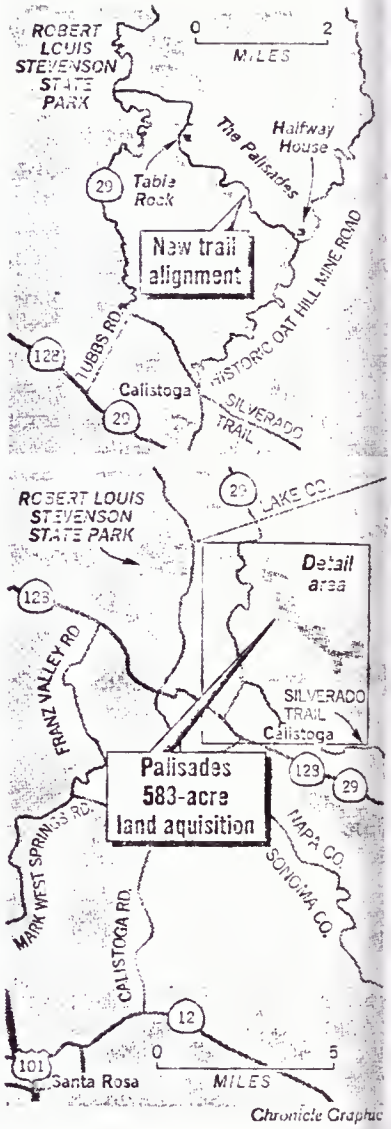
"I think this will be one of the premiere hiking trails in California," said John Hoffnagle, the land trust's executive director.

Surveyors are using pink flags to mark the steep, narrow trail, and construction will begin in the spring — with piles of rocks used to designate key trail points.

When it's completed in 1999, the Palisades trail will provide a daylong wilderness experience for advanced hikers. The 5-mile-long trail will not be open to equestrians or mountain bikers.

The new trail will connect the 125-year-old Oat Hill Mine Road out of

TREASURE: *Page A19 Col. 1*




From Page A15

Calistoga to an existing trail that leads to the top of Mount St. Helena. Once the trails and easements are linked, there will be 15 miles of continuous trail from the summit of Mount St. Helena to Calistoga.

Conservationists say preserving the slopes will not only benefit hikers, but also maintain the vistas from the valley floor. "The hillside estates are creeping up the hill," Hoffnagle said. "Napa Valley prices are soaring, and everyone wants their estate in Napa."

The state paid $640,000 for the 588 acres. The Napa Valley Land Trust previously acquired much of the acreage from eight families who ran a hunting club on the property.

Harry Tranmer, a founding board member of the land trust, worked on the Palisades trail project since 1965. "Over 30 years ago it was a dream," he said. "A good idea dies hard."

It's the latest success story for land trusts, a nationwide grassroots movement that has preserved millions of acres from development. Generally, land trusts are able to move more quickly and quietly than public agencies in acquiring land for conservation.

The state purchase was made possible by funds from Proposition 70, a parks and wildlife initiative passed by California voters in 1988.

The Livermore family donated 62 acres that includes one of the most prominent features of the Palisades: the Peregrine cliffs.

"This is all pretty much wilderness area, for four or five or six miles back," said Putnam Livermore, pointing to a swath of land above the Napa Valley floor. As a boy, Livermore, a San Francisco attorney, spent summers working with his four brothers on his family's ranch on the slopes of Mount St. Helena.

Livermore's grandmother first bought land here in 1880. His father, Norman B. Livermore, gave 40 acres in 1949 to help start Robert Louis Stevenson State Park. The recent addition brings the park's total acreage to more than 5,000 acres in Napa, Sonoma and Lake counties.

It is an area rich in history and natural resources.

The trail will begin in the Highway 29 parking lot across from the old toll house on the Lawley Toll Road — a few hundred yards from the old Silverado mining camp where Stevenson spent the summer of 1880 to honeymoon with his new bride, Fanny Osbourne, and to recuperate from a pulmonary condition.

Finished in 1868, mining companies used the toll road to deliver payroll to miners and to send shipments of gold, silver and quicksilver to the railroad yards. Stagecoaches used the road to transport vacationers. A toll bar stopped all traffic so that proprietor Mollie Patten could collect hefty fees from passing coaches.

Starting out at 2,100 feet above sea level, hikers will zigzag through the back country and traverse a few ridges to the foot of Table Rock, a spectacular rock outcropping that looks like a huge pedestal with 200-foot cliffs below it. The landmark resembles Stevenson's description of "the Spyglass" — Treasure Island's tallest summit.

A botanist once called this area a "floral island" because of its mix of Sierra and valley trees ranging from ghost pines to live oak and buckeye. In spring, there are myriad shades of green, moss seems to drip off the craggy peaks, and the ridges are dotted with poppies, bitterroot and wild onions.

The trail will also skirt the base of the Peregrine Cliffs — volcanic rock formations that look like tall sugar crystals. Two pairs of Peregrine falcons are known to nest in the cavities of these stony spires.

"They like commanding views," says state park ranger Bill Grummer, a naturalist and historian who has worked in the Napa Valley for 23 years. "They like to rule over their domain."

The peregrine falcon can dive at 200 mph, making it the fastest creature in nature.

In 1977, biologists from the U.S. Fish and Wildlife Service aided the return of the peregrine falcon to this ridgetop. At one point, a federal ranger camped out here to protect falcons from poachers seeking to sell the valuable birds and their eggs on the black market.

Other wildlife in these canyons include roadrunners, rock wrens and occasional sightings of mountain lions.

The Palisades trail mainly will be a downhill trek, but rangers warn that it can get awfully hot and hikers will need to carry plenty of water. Signs will be posted that warn hikers to turn back if they haven't reached specific milestones by certain times of day.

"We want to keep it a primitive experience," Hoffnagle said, "(but) we've had experienced leaders get lost here."

Five miles from the toll booth, the Palisades trail will link up with the Oat Hill Mine Road near the deserted ruins of the Halfway House landmark. Chinese laborers once lived in this stone house, which is halfway between Calistoga and an abandoned mercury mine.

The Oat Hill Mine Road was built more than 100 years ago to service quicksilver mines in the Palisades area. It became a four-wheel-drive road in the 1970s, but off-road vehicles were banned after several fatal accidents. In recent years, it has become a popular trail for hikers and mountain bikers.

The lower portion of the old mining road winds down five miles to the Silverado Trail highway in Calistoga. At the base of the trail is the English Pub, known for its fresh brew and hospitality. "The beer's pretty good at the end of the day," Hoffnagle said.

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